2016

Groundwater Management Plan

Santa Clara Valley Water District

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Santa Clara Valley Water District

2016 Groundwater Management Plan
Santa Clara and Llagas Subbasins

Prepared by:

Bassam Kassab, P.E.
Senior Water Resources Specialist

George Cook, P.G.
Associate Engineering Geologist

Under the Direction of:

Vanessa De La Piedra, P.E.
Unit Manager
Groundwater Monitoring and Analysis Unit

Garth Hall, P.E.
Deputy Operating Officer
Water Supply Division

James Fiedler, P.E.
Chief Operating Officer
Water Utility Enterprise

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Santa Clara Valley
Water District

Contributors:

Chanie Abuye
Benjamin Apolo III
Henry Barrientos
Randy Behrens
Victoria García
Ardy Ghoreishi
Simon Gutierrez
Tracy Hemmeter
Peggy Lam
Jeannine Larabee
Yaping Liu
Thomas Mohr
Roger Pierno
Erick Soderlund
Xiaoyong Zhan

Interns:

Cecilia Dominguez
Jesús García
Nima Mazhari
Eloisa Tan

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Acronyms and Abbreviations

AF: acre-feet

AFY: acre-feet per year

BAO: Board Appointed Officer

Board: Santa Clara Valley Water District Board of Directors

CASGEM: California Statewide Groundwater Elevation Monitoring Program

CCAMP: Central Coast Ambient Monitoring Program

CEO: Chief Executive Officer

County: Santa Clara County

CVP: Central Valley Project

CY: Calendar Year

DDW: State Water Resources Control Board Division of Drinking Water

DEH: Santa Clara County Department of Environmental Health

DFW: California Department of Fish and Wildlife

District: Santa Clara Valley Water District

District Act: Santa Clara Valley Water District Act

DSOD: California Division of Safety of Dams

DTSC: California Department of Toxic Substances Control

DWR: California Department of Water Resources

DWSAP: Drinking Water Source Assessment and Protection Program

EDD: Electronic Data Deliverable

EIR: Environmental Impact Report

FAHCE: Fisheries and Aquatic Habitat Collaborative Effort

FWS: United States Fish and Wildlife Service

FY: Fiscal Year (July 1 to June 30)

GAMA: Groundwater Ambient Monitoring assessment

GCRCD: Guadalupe Coyote Resource Conservation District

GIS: Geographic Information System

GMMP: Groundwater Mitigation and Monitoring Plan

GSA: Groundwater Sustainability Agency

GSP: Groundwater Sustainability Plan

GWMP: Groundwater Management Plan

IDT: Integrated Device Technology, Inc.

ILRP: Irrigated Lands Regulatory Program

InSAR: Interferometric Synthetic Aperture Radar

IQR: Interquartile range

LAMP: Local Agency Management Plan

LIDAR: Light Imaging, Detecting, and Ranging

LLNL: Lawrence Livermore National Laboratory

LUFT: Leaking Underground Fuel Tank

MCL: Maximum Contaminant Level

MGD: Million gallons per day

MLE: Maximum Likelihood Estimate

MRP: Municipal Regional Permit

MTBE: Methyl tert-butyl ether

NAVD 88: North American Vertical Datum of 1988

NDMA: N-Nitrosodimethylamine

NGVD 29: National Geodetic Vertical Datum of 1929

NMFS: National Marine Fisheries Service

NPDES: National Pollutant Discharge Elimination System

OWTS: Onsite Wastewater Treatment Systems

PAWS: Protection and Augmentation of Water Supplies

PFC: Perfluorochemical

PPT: parts per trillion

PSI: pounds per square inch

QA: Quality Assurance

QC: Quality Control

RWIG: Recycled Water Irrigation and Groundwater

SBA: South Bay Aqueduct

SBWR: South Bay Water Recycling

SCRWA: South County Regional Wastewater Authority

SCVURPPP: Santa Clara Valley Urban Runoff Pollution Prevention Program

SCVWCD: Santa Clara Valley Water Conservation District

Acronyms and Abbreviations

SFEI: San Francisco Estuary Institute

SFPUC: San Francisco Public Utilities Commission

SGMA: Sustainable Groundwater Management Act

SMCL: Secondary Maximum Contaminant Level

SNMP: Salt and Nutrient Management Plan

State Water Board: State Water Resources Control Board

SVAWPC: Silicon Valley Advanced Water Purification Center

SWID: Stormwater Infiltration Device

SWP: State Water Project

TDS: Total Dissolved Solids

USEPA: United States Environmental Protection Agency

USGS: United States Geological Survey

UST: Underground Storage Tank

UWMP: Urban Water Management Plan

VOC: Volatile Organic Compound

Water Board: Regional Water Quality Control Board

Water Code: California Water Code

WPCP: Water Pollution Control Plant

WTP: Water Treatment Plant

WWTP: Wastewater Treatment Plant

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Executive Summary

EXECUTIVE SUMMARY

Nearly half of the water used in Santa Clara County (county) is pumped from the Santa Clara and Llagas subbasins, with some communities relying solely on groundwater. For over 80 years, the Santa Clara Valley Water District (District) has managed groundwater in the county per statutory authority provided by the Santa Clara Valley Water District Act (District Act).[1] The District's comprehensive groundwater management programs and investments have resulted in sustainable groundwater conditions for many decades, and will ensure groundwater resources are sustainable far into the future.

This 2016 Groundwater Management Plan (GWMP) describes the District's comprehensive groundwater management framework, including existing and potential actions to achieve basin sustainability goals and ensure continued sustainable groundwater management. The GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by the Department of Water Resources (DWR) as Basins 2-9.02 and 3-3.01, respectively.

GROUNDWATER MANAGEMENT PLAN AUTHORITY

This 2016 GWMP is prepared pursuant to authority granted by the District Act and supersedes all previous Groundwater Management Plans.

The 2016 GWMP also satisfies the objectives of the Sustainable Groundwater Management Act (SGMA). SGMA, enacted by the state legislature in 2014, and subsequent Groundwater Sustainability Plans (GSPs) Emergency Regulations have resulted in statewide requirements for basins designated as medium and high priority basins by DWR. In the basins designated by DWR as medium and high priority, local public agencies and Groundwater Sustainability Agencies (GSAs) are required to develop and implement GSPs or alternatives to GSPs (Alternative Plans). DWR has identified the Santa Clara and Llagas subbasins as medium- and high-priority basins, respectively.

The 2016 GWMP meets the requirements of California Water Code (Water Code) Section 10733.6, which allows for an Alternative Plan to be submitted to DWR. Specifically, the District believes the 2016 GWMP, prepared pursuant to the District Act, qualifies as an Alternative Plan per Water Code Section 10733.6(b)(1), which defines an Alternative Plan as a plan developed pursuant to other law authorizing groundwater management. The 2016 GWMP, which updates technical information from the District's previous GWMP adopted by the Board in 2012, meets the objectives of SGMA and contains information and elements that are functionally equivalent to the elements of a GSP required by Articles 5 and 7 of the GSP Emergency Regulations.

DISTRICT OVERVIEW

The District is an independent special district that provides wholesale water supply, groundwater management, flood protection, and stream stewardship for its service area, which includes all of Santa Clara County. The mission of the District is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy. The District is governed by an elected Board of Directors, comprised of seven members elected from equally-divided districts drawn through a formal process.

Formed in 1929 in response to groundwater overdraft and subsidence, the District has been a leader in the conjunctive management of groundwater and surface water for many decades. Under the District Act, the District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water

[1] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.

and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.[2]

SGMA lists the District as one of fifteen exclusive agencies with powers to comply with SGMA within its statutory boundary.[3] In May 2016, following a public hearing, the District Board of Directors (Board) adopted a resolution to become the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas subbasins.

Groundwater management programs are funded by the District's Water Utility Enterprise, with funding sources including charges for groundwater production, treated water, recycled water, and surface water, along with property taxes, interest earnings, reimbursements, and grants. These funds are used to operate and maintain the District's complex water supply infrastructure network, maintain water supply sources and water rights, and make capital improvements as needed to ensure water supply reliability.

WATER SUPPLY AND GROUNDWATER OVERVIEW

The District manages a diverse water supply portfolio, with sources including groundwater, local surface water, imported water, and recycled water. About half of the county's water supply comes from local sources and the other half comes from imported sources. Imported water includes the District's State Water Project and Central Valley contract supplies and supplies delivered by the San Francisco Public Utilities Commission (SFPUC) to cities in northern Santa Clara County. Local sources include natural groundwater recharge and surface water supplies. A small, but growing, portion of the county's water supply is recycled water.

The District supplies are distributed to recharge facilities in the Santa Clara and Llagas subbasins, drinking water treatment plants, local creeks for environmental needs, or directly to water users. The conjunctive management of surface water and groundwater maximizes water supply reliability, allowing the District to store surface water in local groundwater basins to help balance pumping and provide reserves for use during dry years when surface water availability is limited.

Local groundwater resources make up the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water supply management activities to reliably meet the county's needs. These include the managed recharge of imported and local surface water and in-lieu recharge through the provision of treated surface water, acquisition of supplemental water supplies, and water conservation and recycling. The District also has programs to protect, manage and sustain water resources. The District operates and maintains a complex infrastructure network, with major features including:

- 10 surface water reservoirs
- 169,000 acre-feet total reservoir storage capacity
- 17 miles of raw surface water canals
- 393 acres of groundwater recharge ponds
- 91 miles of controlled in-stream recharge
- 142 miles of pipelines
- three pumping stations
- three drinking water treatment plants
- Silicon Valley Advanced Water Purification Center

In addition to working to secure adequate water supplies for the county, the District also has a long history of protecting groundwater resources, beginning with efforts to address salt water intrusion adjacent to San Francisco

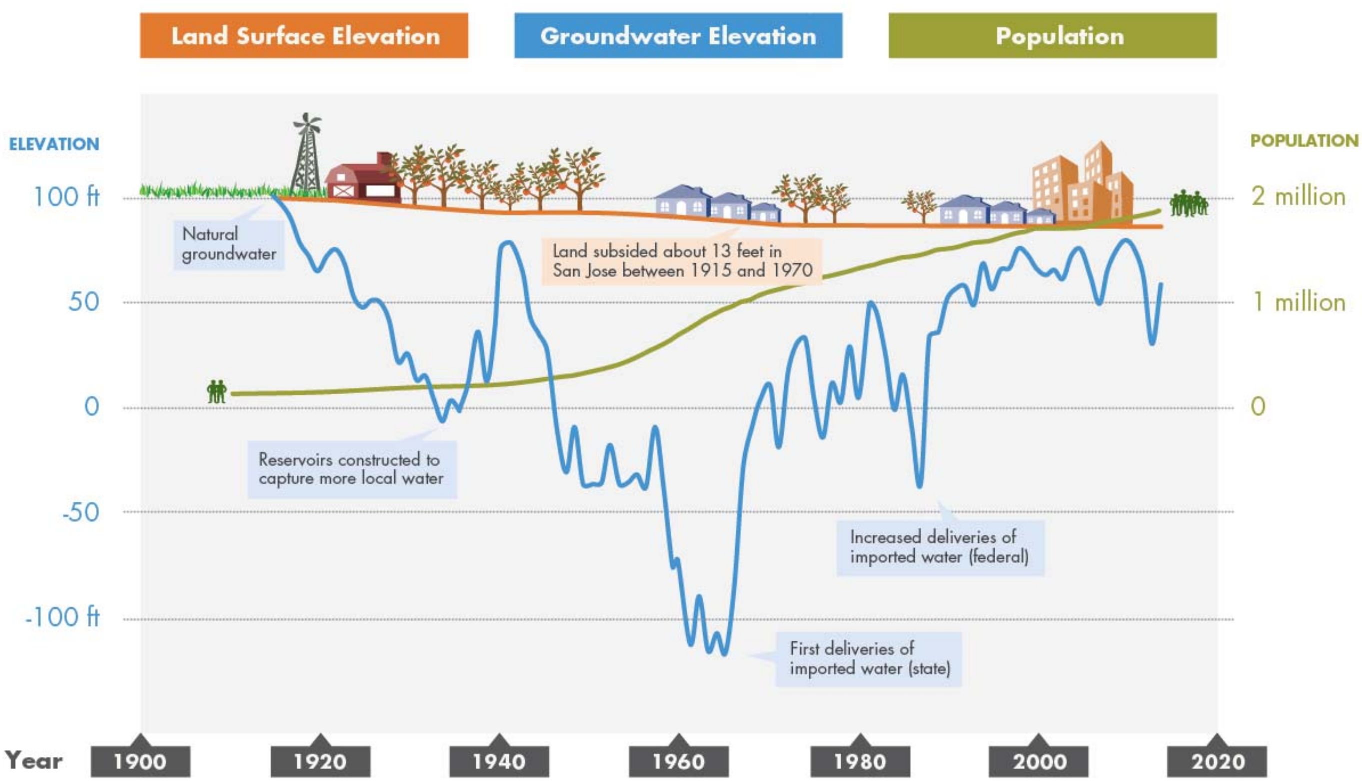
[2] District Act, Sections 4 and 5.

[3] California Water Code Section 10723 (a).

Bay in the late 1950s.[4] In the 1980s, contamination from leaking chemical storage tanks at semiconductor manufacturing facilities brought groundwater quality issues to the forefront. District efforts to aggressively protect groundwater quality have included close coordination with regulatory agencies overseeing cleanup, the implementation of numerous programs including efforts to seal abandoned wells and reduce nitrate loading, the oversight of fuel leak cases, the regulation of wells, and efforts to influence statewide policy from threats such as MTBE, an additive formerly used in gasoline.[5] More recently, the District worked with stakeholders to develop Salt and Nutrient Management Plans to assess salt and nutrient loading to groundwater and identify related management strategies. This includes ensuring recycled and purified water projects are adequately protective of local groundwater quality.

Protecting groundwater resources is a key District mission as demonstrated by District Board Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion." Figure ES-1 shows how the District's investments and conjunctive management programs have contributed to a sustainable groundwater supply.

Figure ES-1. Santa Clara County Groundwater History



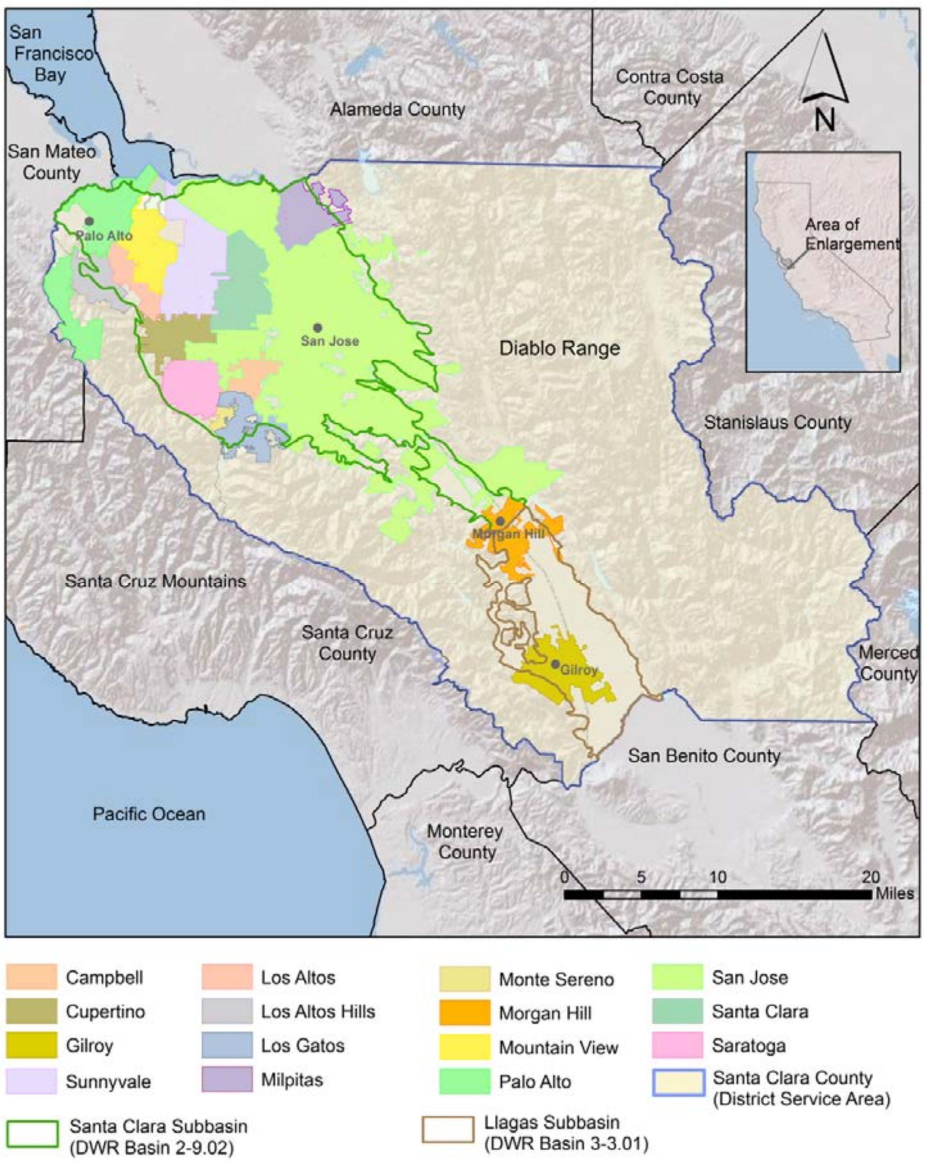
GROUNDWATER SUBBASINS

The 2016 GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by DWR as Basins 2-9.02 and 3-3.01, respectively (Figure 1-1).[6] The Santa Clara Subbasin is part of the Santa Clara

[4] Santa Clara Valley Water District, Saltwater Intrusion Investigation, September 1980.
[5] California History Center & Foundation, Water in the Santa Clara Valley: A History, 2005.
[6] California Department of Water Resources, California's Groundwater: Bulletin 118 Update 2003.

Valley Basin (Basin 2-9), which extends from southern San Jose north into Alameda, Contra Costa, and San Mateo counties. The Llagas Subbasin is part of the Gilroy-Hollister Valley Basin (Basin 3-3), which extends from Morgan Hill into San Benito County. The Santa Clara and Llagas subbasins cover a surface area of approximately 385 square miles (Figure ES-2). Due to different land use and management characteristics, the District further delineates the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley.

Figure ES-2. Santa Clara County Groundwater Subbasins



The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams. In addition, the groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins also provide some natural filtration of surface water as it percolates through the soil and rock. The groundwater

subbasins provide water storage, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years. Due to the District's comprehensive groundwater management programs, the subbasins are in long-term balance. Groundwater quality is typically very good, and most public water supply wells do not require any treatment beyond disinfection.

2016 GROUNDWATER MANAGEMENT PLAN

The District's prior Groundwater Management Plan was adopted by the Board in 2012 and described the District's comprehensive groundwater management framework, including basin management objectives, strategies, groundwater management programs, and outcome measures. The 2016 GWMP updates and expands on technical information in the 2012 GWMP and is prepared as an Alternative to a GSP under SGMA. Basin management goals, strategies, programs, and outcome measures in the 2016 GWMP (summarized below) are very similar to the 2012 plan, as they have been effective in ensuring sustainable conditions.

Lastly, the 2016 GWMP acknowledges potential new authorities under SGMA that would be available upon Board adoption of the 2016 GWMP. These include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

The District will review and update the GWMP as needed, but at least every five years. This will ensure compliance with SGMA requirements for Alternatives, and provide current groundwater management information to support five-year updates of the Urban Water Management Plan (UWMP) as required by State law.

BASIN SUSTAINABILITY GOALS AND STRATEGIES

Using the District's overall water supply management objectives, the following sustainability goals related to groundwater supply reliability and protection were developed:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

These describe the overall objectives of the District's groundwater management programs. The basin management strategies below are used to meet the sustainability goals. Many of these strategies have overlapping benefits, acting to improve water supply reliability, minimize subsidence, and protect or improve groundwater quality. The strategies are listed below and are described in detail in Chapter 6 of this report.

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

BASIN MANAGEMENT PROGRAMS AND ACTIVITIES

The District and local partners have implemented numerous programs to protect groundwater resources that support the sustainability goals and strategies. The District's annual Protection and Augmentation of Water Supplies (PAWS) Report[7] presents detailed information on District activities to ensure sustainable groundwater supplies, as

[7] Available at www.valleywater.org.

does Chapter 5 of this GWMP. The District's Water Utility Enterprise operations and capital budget for fiscal year 2016-17 is $359 million.

The assessment of groundwater conditions relies on timely, accurate, and representative data. The District's comprehensive monitoring programs related to groundwater levels, land subsidence, groundwater quality, recharge water quality, and surface water flow are described in detail in Chapter 7 of this plan.

OUTCOME MEASURES

The District has developed the following outcome measures to gauge performance in meeting the basin sustainability goals:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds at the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The basis for these outcome measures and a description of how they will be evaluated is presented in Chapter 6 of this plan. The measures will be assessed annually, with related results presented in the District's Annual Groundwater Report. If evaluation of the outcome measures indicates poor performance toward meeting a basin sustainability goal, the District will first evaluate potential changes to existing programs and activities prior to considering significant groundwater management changes. Any significant policy or investment decisions would be developed and evaluated in consultation with local stakeholders, as the District does in current planning and budgeting processes.

NEXT STEPS

The District's proactive groundwater management programs and activities have resulted in sustainable groundwater conditions in the Santa Clara and Llagas subbasins, and continued planning, investments, and coordination will be needed to address future water supply challenges. Groundwater demands are projected to increase in the future, and the District is coordinating with water retailers and other interested stakeholders during the development of the Water Supply Master Plan, which will recommend various actions and investments needed to address projected future shortfalls during multi-year droughts. The District is scheduled to complete the Water Supply Master Plan in 2017.

To maintain the long-term viability of groundwater resources, the following actions are recommended:

1. Maintain existing conjunctive water management programs and evaluate opportunities for enhancement or increased efficiency.
2. Continue to aggressively protect groundwater quality through District programs and collaboration with land use agencies, regulatory agencies, and basin stakeholders.
3. Continue to incorporate groundwater sustainability in District planning efforts.
4. Maintain adequate monitoring programs and modeling tools.
5. Continue and enhance groundwater management partnerships with water retailers and land use agencies.
6. Evaluate the potential new authorities provided by SGMA.

Chapter 1 – Introduction

CHAPTER 1 – INTRODUCTION

For over 80 years, the Santa Clara Valley Water District (District) has managed groundwater in Santa Clara County (county) per statutory authority provided by the Santa Clara Valley Water District Act (District Act).[8] The District's comprehensive groundwater management programs and investments have resulted in sustainable groundwater conditions for many decades. In May 2016, following a public hearing, the District Board of Directors (Board) adopted a resolution to become the Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas subbasins (Appendix A). The District is also the primary water wholesaler, flood manager, and stream steward for the county.

Nearly half of the water used in the county is pumped from groundwater, with some communities relying solely on groundwater. The purpose of this 2016 Groundwater Management Plan (GWMP) is to describe basin management objectives and strategies, programs and activities that support those objectives, and outcome measures to gauge performance. This chapter provides an overview of the District and the GWMP. It also describes other partners in groundwater management and stakeholder participation in the GWMP.

1.1 GROUNDWATER MANAGEMENT PLAN 2016 OVERVIEW

The District's prior GWMP, adopted by the Board in July 2012, documented the District's comprehensive groundwater management framework, including authorities, goals, programs, and metrics to assess performance.

This 2016 GWMP is prepared pursuant to authority granted by the District Act and supersedes all previous Groundwater Management Plans. The 2016 GWMP also satisfies the objectives of the Sustainable Groundwater Management Act (SGMA). SGMA, enacted by the state legislature in 2014, and subsequent Groundwater Sustainability Plans (GSPs) Emergency Regulations have resulted in statewide requirements for basins designated as medium and high priority basins by DWR. In the basins designated by DWR as medium and high priority, local public agencies and Groundwater Sustainability Agencies (GSAs) are required to develop and implement GSPs or alternatives to GSPs (Alternative Plans). DWR has identified the Santa Clara Subbasin as a medium-priority subbasin and the Llagas Subbasin as a high-priority subbasin based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts. Neither subbasin has been identified as being in overdraft.

The 2016 GWMP meets the requirements of California Water Code (Water Code) Section 10733.6, which allows for an Alternative Plan to be submitted to DWR. Specifically, the District believes the 2016 GWMP, prepared pursuant to the District Act, qualifies as an Alternative Plan per Water Code Section 10733.6(b)(1), which defines an Alternative Plan as a plan developed pursuant to other law authorizing groundwater management. The 2016 GWMP, which updates technical information from the District's previous GWMP, meets the objectives of SGMA and contains information and elements that are functionally equivalent to the elements of a GSP required by Articles 5 and 7 of the GSP Emergency Regulations. The 2016 GWMP's functional equivalence to the elements of a GSP required by the GSP Emergency Regulations is described further in Appendix B. The District's contact for groundwater management issues is:

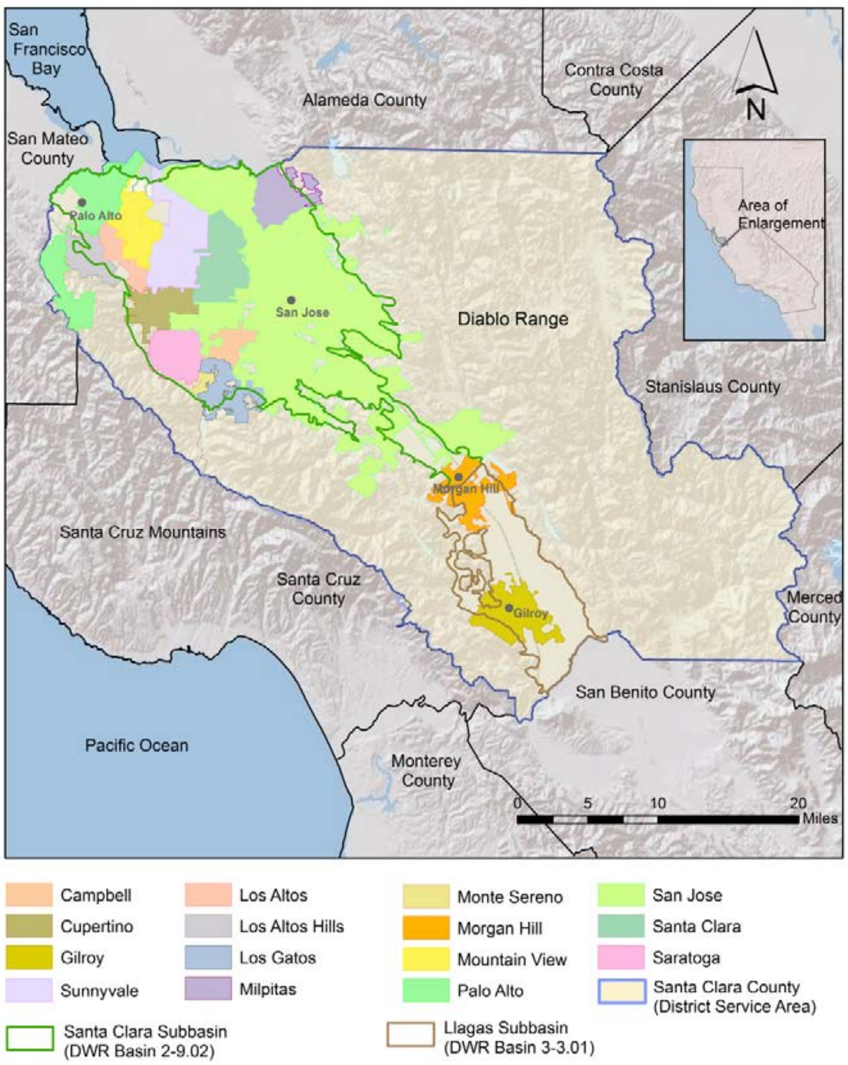
Ms. Vanessa De La Piedra, P.E.
Groundwater Monitoring and Analysis Unit Manager
5750 Almaden Expressway
San Jose, CA 95118
Telephone: (408) 630-2788
E-mail: vdelapiedra@valleywater.org

[8] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.

1.2 DESCRIPTION OF PLAN AREA

The 2016 GWMP covers the Santa Clara and Llagas subbasins, located entirely in Santa Clara County and identified by DWR as Basins 2-9.02 and 3-3.01, respectively (Figure 1-1).[9] The Santa Clara Subbasin is part of the Santa Clara Valley Basin (Basin 2-9), which extends from southern San Jose north into Alameda, Contra Costa, and San Mateo counties. The Santa Clara Valley Basin is divided into four subbasins, including the Santa Clara Subbasin within the District's service area. Due to different land use and management characteristics, the District further delineates the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley as described further in Chapter 2. The Llagas Subbasin is part of the Gilroy-Hollister Valley Basin (Basin 3-3), which extends from Morgan Hill into San Benito County. The Gilroy-Hollister Valley Basin has four subbasins, including the Llagas Subbasin within Santa Clara County.

Figure 1-1. Santa Clara and Llagas Subbasins



[9] California Department of Water Resources, California's Groundwater: Bulletin 118 Update 2003.

Santa Clara County is located at the southern end of the San Francisco Bay and encompasses approximately 1,300 square miles, making it the largest of the nine Bay Area counties. The county supports a population of about 1.9 million, although that is projected to increase to over 2.4 million by 2040. Most water use occurs on the valley floor between the Santa Cruz Mountains to the west and the Diablo Range to the east. The footprint of the valley floor is essentially coincident with land overlying the Santa Clara and Llagas subbasins. Northern Santa Clara County (North County) is home to Silicon Valley and is highly urbanized. Southern Santa Clara County (South County) has some urban development, but much of the land use is still rural and agricultural. North County generally coincides with land overlying the Santa Clara Plain, while South County generally represents land over the Coyote Valley and Llagas Subbasin.

The county's Mediterranean semi-arid climate is temperate year-round, with warm and dry weather lasting from late spring through early fall. Average annual precipitation ranges from about 15 inches on the valley floor to about 45 inches along the crest of the Santa Cruz Mountains. Maximum daily temperature averaged by month in San Jose ranges from 58 to 82 degrees Fahrenheit, with average annual evapotranspiration of 49.6 inches.[10]

1.3 BASELINE AND PLANNING HORIZON

The 2016 GWMP describes the Santa Clara and Llagas subbasins based on the most recent, representative water supply, demand, and water quality conditions. Information related to groundwater budgets is presented for the period 2003 through 2012, chosen to indicate longer-term (10 year) conditions including wet, normal, and dry years, but excluding more recent, prolonged drought conditions. 2012 is used to display single-year groundwater supply information such as pumping distribution and groundwater elevation contours. Groundwater quality data, less affected by drought conditions, is presented based on the most recent data available for the ten-year period from 2006 to 2015. While this approach results in a range of time periods presented, it best represents typical groundwater conditions in the Santa Clara and Llagas subbasins.

The plan also documents the effects of the recent drought through long-term hydrographs, annual change in groundwater storage charts, and other information. Prolonged drought resulted in lower groundwater levels and storage in the Santa Clara and Llagas subbasins, prompting the District Board to call for short-term water use reduction in 2014, 2015, and 2016 in accordance with the District's Water Shortage Contingency Plan. Significant recovery of groundwater levels and storage has been observed in 2015 and 2016 due to community water use reduction, retailer shifts to treated surface water, and increased managed recharge. Detailed information on more recent groundwater conditions is available in the District's Annual Groundwater Reports prepared each calendar year. The 2015 Annual Groundwater Report is included in Appendix C.

The District ensures reliable water supplies for all types of hydrologic years through annual operations planning and long-term planning studies like the Urban Water Management Plan (UWMP) and Water Supply Master Plan. These long-term plans use over 80 years of measured or correlated local hydrologic data, are supported by information in the GWMP, have a 25-year planning horizon, and are updated every five years. The District's adaptive operational decisions and proactive long-term water supply planning and investments will ensure continued, sustainable groundwater conditions long into the future.

1.4 DISTRICT OVERVIEW

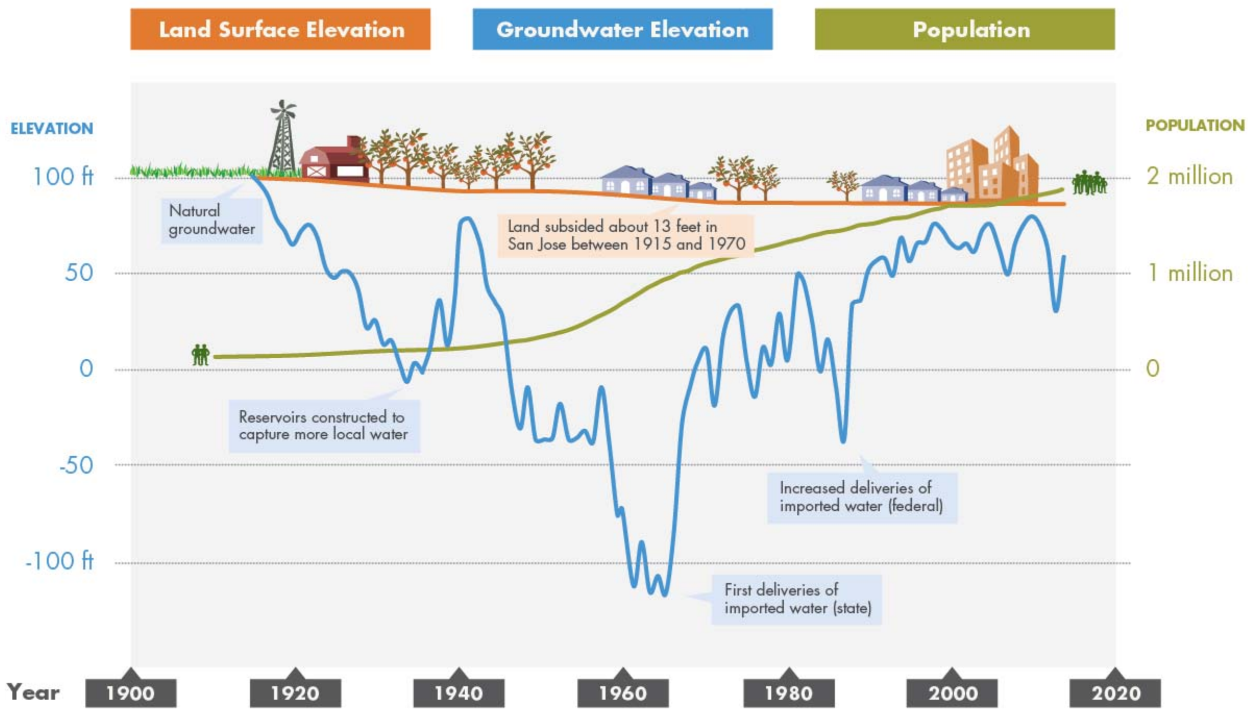
The District is an independent special district that provides wholesale water supply, groundwater management, flood protection, and stream stewardship for its service area, which includes all of Santa Clara County. The mission of the District is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy.

[10] Santa Clara Valley Water District, 2015 Urban Water Management Plan.

Chapter 1 – Introduction

As described in Section 1.3.1, the District was formed in 1929 in response to groundwater overdraft and subsidence. The District has been a leader in conjunctive management for many decades, using imported and local surface water to supplement groundwater and maintain reliability in dry years. Figure 1-2 shows how the District's investments and conjunctive management programs have contributed to a sustainable groundwater supply.

Figure 1-2. Santa Clara County Groundwater History

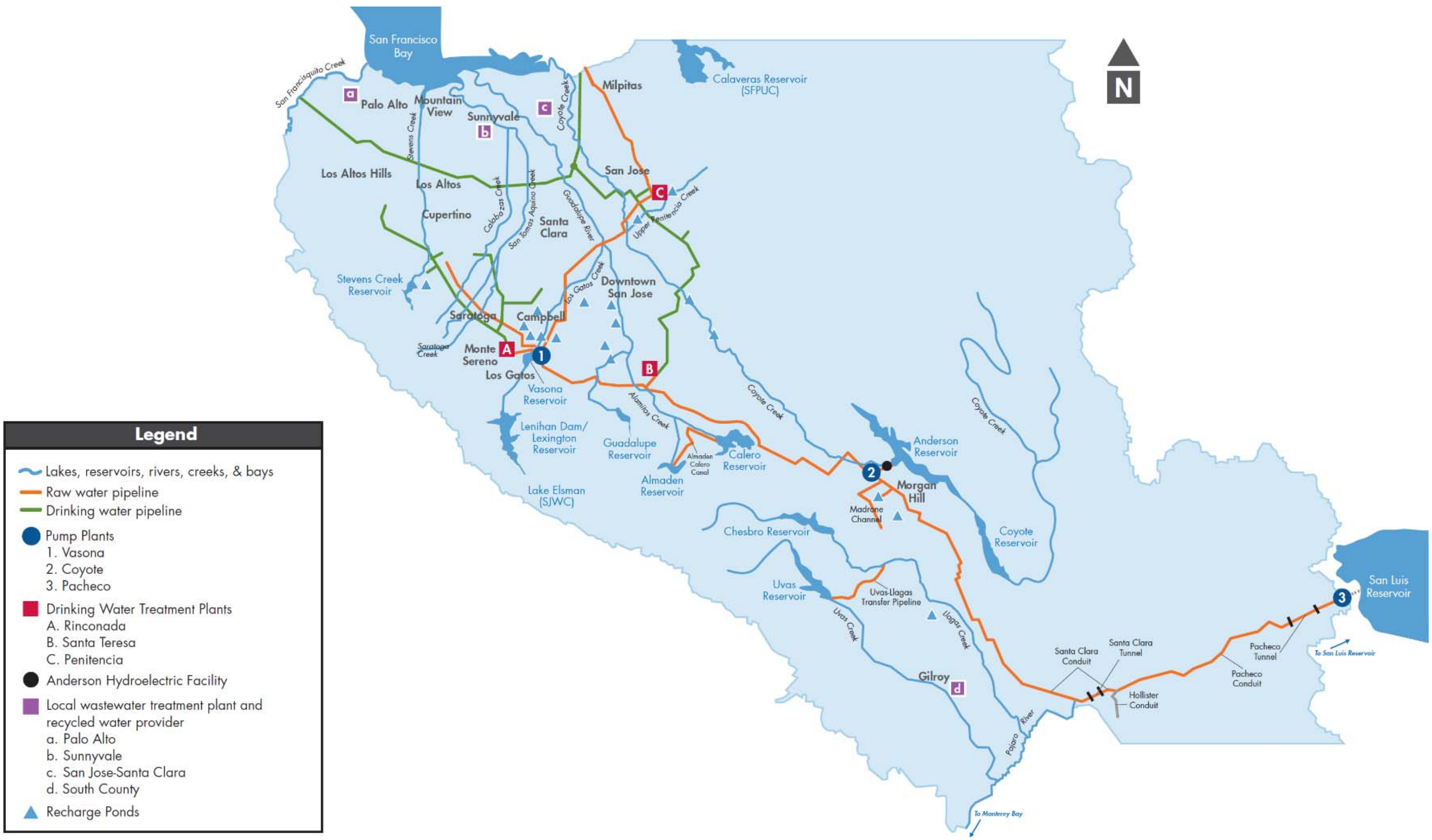


The District manages a diverse water supply portfolio, with sources including groundwater, local surface water, imported water, and recycled water. About half of the county's water supply comes from local sources and about half comes from imported sources. Imported water includes the District's State Water Project and Central Valley contract supplies and supplies delivered by the San Francisco Public Utilities Commission (SFPUC) to cities in northern Santa Clara County. Local sources include natural groundwater recharge and surface water supplies, including surface water rights held by the District, San Jose Water Company, and Stanford University. A small but growing portion of the county's water supply is recycled water. Long-term water conservation is also a key component of the District's water supply management strategy. Conservation programs saved approximately 64,000 AF in 2015 and are on target to reduce annual demands by nearly 100,000 AF by 2030.

The District supplies are distributed to recharge facilities in the Santa Clara and Llagas subbasins, the District's three drinking water treatment plants, local creeks to meet environmental needs, or directly to water users. The conjunctive management of surface water and groundwater maximizes water supply reliability, allowing the District to store surface water in local groundwater basins to help balance pumping and provide reserves for use during dry years when surface water availability is limited.

The District operates and maintains a complex infrastructure network, integrating natural and constructed systems to capture and convey raw and treated water for a reliable water supply (Figure 1-3).

Figure 1-3. District Water Supply Treatment and Distribution System



The District system delivers about 300 million gallons of raw water and 200 million gallons of treated drinking water every day (subject to water demand and hydrologic changes) and includes the following major facilities:

- 10 surface water reservoirs
- 169,000 acre-feet of total reservoir storage capacity
- 17 miles of raw surface water canals
- 393 acres of groundwater recharge ponds
- 91 miles of controlled in-stream recharge
- 142 miles of pipelines
- three pumping stations
- three drinking water treatment plants
- Silicon Valley Advanced Water Purification Center

Long-term water supply and use for the North County is shown in Figure 1-4, and for the less urbanized South County in Figure 1-5.

Figure 1-4. North County Water Supply and Use (2005 to 2015)

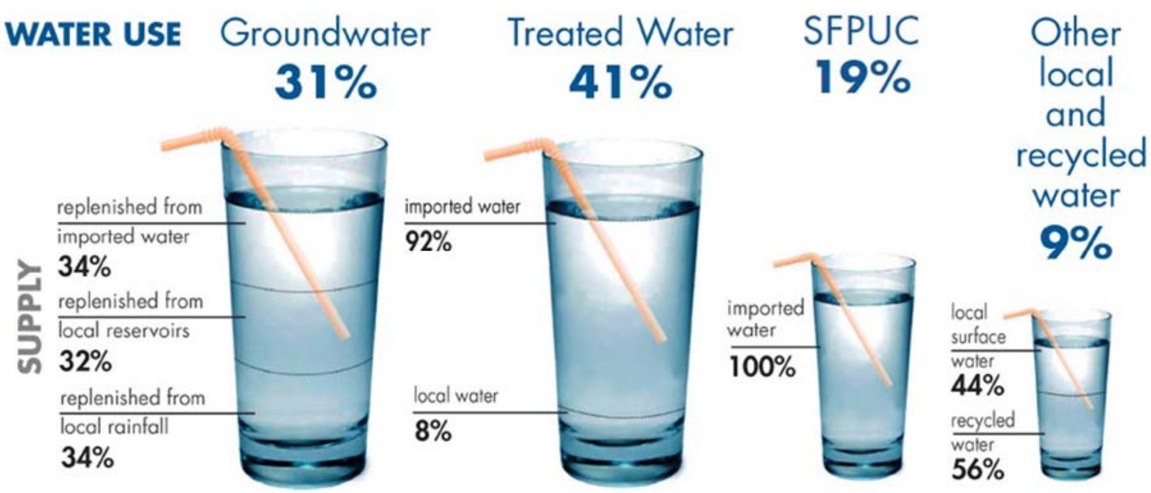
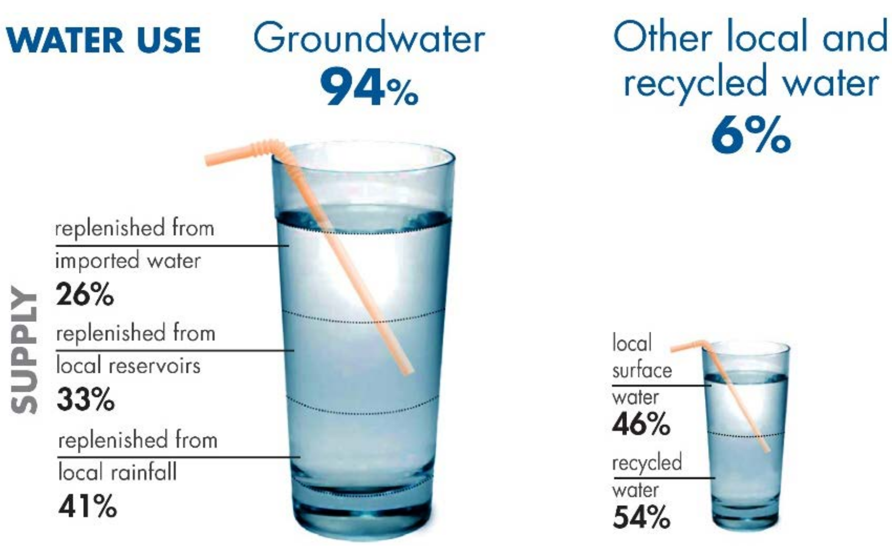


Figure 1-5. South County Water Supply and Use (2005 to 2015)



1.4.1 District History

Water has played an important part in the development of the county since the Spaniards' arrival in 1776. Unlike indigenous peoples who depended upon the availability of wild food, the Spaniards cultivated food crops and irrigated with surface water. Population growth and the United States' conquest of the area in 1846 increased agricultural demands, which forced the use of groundwater. The first well was drilled in 1854 in San Jose. Groundwater was drawn to the surface by windmill pumps or flowed up under artesian conditions.

By 1865, there were almost 500 artesian wells in the valley and already signs of potential misuse. In the valley's newspapers, a series of editorials and letters appeared which complained of farmers and others who left their wells uncapped, and blamed them for water shortages and erosion damage to the lowlands.

As a result of several dry years in the late 1890s, more and more wells were installed. Dry winters in the early 1900s were accompanied by a growing demand for the county's fruits and vegetables, which were irrigated with groundwater. The trend of increased irrigation and well drilling continued, causing groundwater levels to drop rapidly. In 1913, a group of farmers asked the federal government for relief from increased pumping costs due to a lower groundwater table. The farmers formed an irrigation district to investigate possible reservoir sites; however, the following year was wet and no action was taken. It was not until 1919 that the Farm Owners and Operators Association presented a resolution to the County Board of Supervisors expressing their strong opposition to the waste resulting from the use of artesian wells, and again raised the issue of building dams to supplement existing water supplies. By that year, subsidence of 0.4 feet had occurred in San Jose.

In 1921, a report was presented to the Santa Clara Valley Water Conservation Committee showing that far more water was being pumped than nature could replace.[11] The committee planned to form a water district differing from others in the state by providing for groundwater recharge. Their effort to form the water district failed, but they were able to implement several water capture and recharge programs. Continued overdraft resulted in a further decline in groundwater levels and additional land subsidence, increasing flood impacts in northern Santa Clara County. Between 1912 and 1932, subsidence ranged from 0.35 feet in Palo Alto to 3.66 feet in San Jose. In 1929, county voters approved the formation of the Santa Clara Valley Water Conservation District (SCVWCD), with the initial mission of stopping groundwater overdraft and subsidence.

The SCVWCD was the forerunner of today's District, which was formed through the consolidation and annexation of other flood control and water districts within Santa Clara County (Figure 1-6). By 1935, the District had completed the construction of Almaden, Calero, Guadalupe, Stevens Creek, and Vasona dams. Later dams completed include Coyote in 1936, Anderson in 1950, and Lexington in 1952. The Gavilan Water District in the southern portion of the county constructed Chesbro Dam in 1955 and Uvas Dam in 1957. These dams enabled the District to capture surface water runoff and release it for groundwater recharge.

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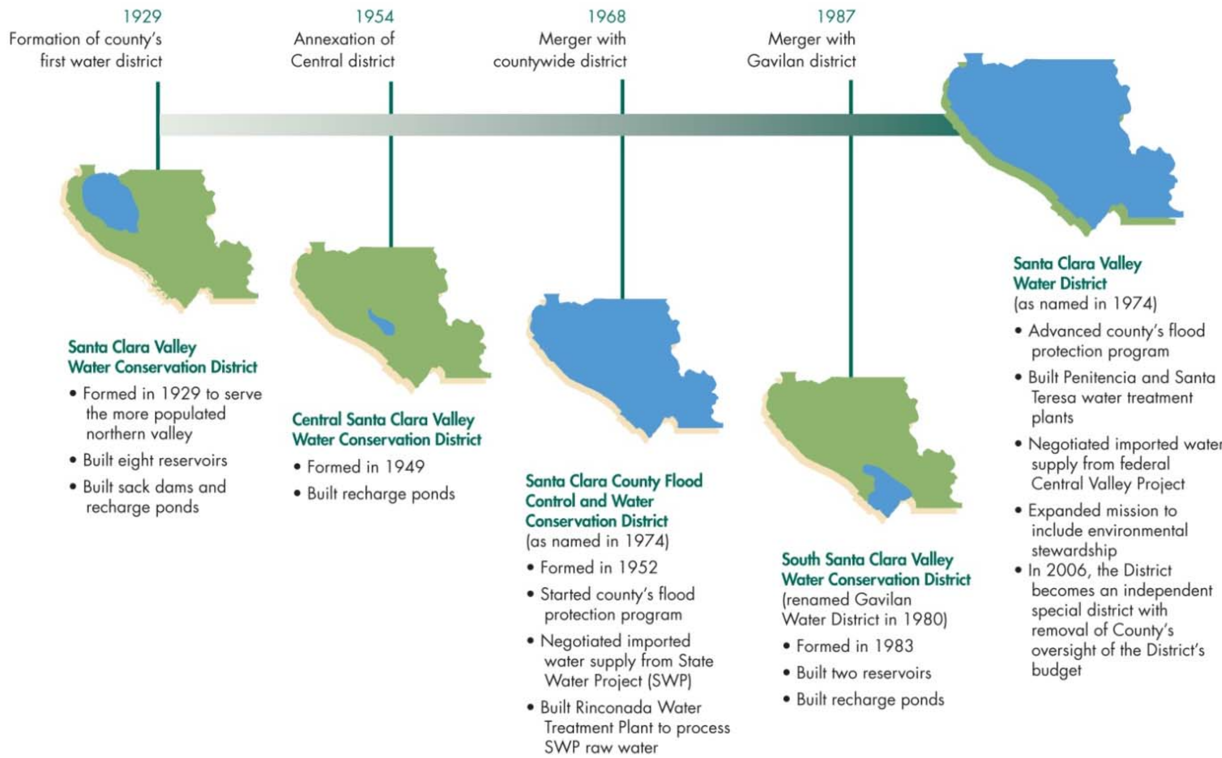
[11] Tibbets F.H. and Kiefer S.E., Santa Clara Valley Water Conservation Project, Report to the Santa Clara Valley Water Conservation Committee, 1921.

Figure 1-6. District Evolution



The late 1930s to 1947 marked a period of recovery in groundwater levels that reduced the rate of land subsidence. In 1947, conditions became dry, groundwater levels declined rapidly and subsidence resumed. In 1950 almost all of the county's water requirements were met by water pumped from the groundwater.

In 1952, the SFPUC began delivering imported water to water retailers in northern Santa Clara County through what is now called the Regional Water System;[12] however, some delivery of this supply into the county took place as early as 1939.[13] By 1960, the population of the county had doubled from that of 1950. To supply this growth, groundwater pumping increased and groundwater levels continued to decline. In addition to continued land subsidence, widespread salt water intrusion of shallow aquifers was observed adjacent to San Francisco Bay in the late 1950s.[14] By the early 1960s, it was evident that the combination of Hetch Hetchy and local water supplies could not meet the area's water demands, so the District entered into a contract with the state to receive 100,000 acre-feet (AF) of State Water Project (SWP) water per year through the South Bay Aqueduct (SBA).

With this new source of supply, the District added a new tool to its groundwater management toolbox: treated surface water sales to offset demand that would otherwise be met through groundwater pumping. The District constructed its first water treatment plant (WTP), the Rinconada WTP. In 1967, the District started delivering treated surface water to North County residents, thus reducing the need for pumping in the Santa Clara Plain. This helped lead to a recovery of groundwater levels and reduced rate of land subsidence.

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[12] The Regional Water System used to be called the Hetch Hetchy southern aqueduct.

[13] Per personal communication with City of Palo Alto staff, the City of Palo Alto began receiving water from SFPUC in 1939 through a different connection.

[14] Santa Clara Valley Water District, Saltwater Intrusion Investigation, September 1980.

From 1960 to 1970, the county's population nearly doubled yet again, with the semiconductor and computer manufacturing industries contributing over 30 percent of the job growth. The growth and prosperity of the county continued, and jobs grew nearly 40 percent between 1970 and 1980. In 1974, Penitencia (the District's second WTP) started delivering treated water. In response to the 1976-1977 drought, the District began its first programs related to conservation education and outreach.

The county's explosive growth and transformation from a predominantly agricultural economy was not without its problems. In the early 1980s, groundwater contamination was brought to the forefront when large underground tanks storing solvents for computer-related manufacturing processes in south San Jose were discovered to be leaking. In 1981, Fairchild notified the District that "a substantial amount of chemicals were missing from their tanks and that a leak was suspected." Subsequent testing of a nearby public water supply well revealed significant contamination, which resulted in shutdown of the well. The District, the Regional Water Quality Control Board, and the Department of Health Services[15] worked together to sample water supply wells in the county and search for other leaking tanks, resulting in the identification of additional contaminant release sites.

In the 1980s, the District significantly increased its efforts to protect groundwater quality. The District worked with the Santa Clara County Fire Chiefs Association, the City Managers Association, and environmental groups to develop a countywide Hazardous Materials Storage Permit Ordinance. The ordinance, adopted by the Santa Clara County Intergovernmental Council, set tough new standards on hazardous material storage and handling. This first- in-the-nation ordinance served as an example and the state and federal government soon passed similar laws. The District also developed standards for the construction and destruction of wells, the majority of which were being installed for the investigation and cleanup at contaminant release sites. The District's abandoned well program was developed to address existing wells that were no longer in use and posed a threat to groundwater resources by acting as vertical conduits that could allow contaminants to migrate directly from shallow to deep aquifers.

In the late 1980s, the District began oversight of petroleum hydrocarbon leaking Underground Storage Tank (UST) sites in Santa Clara County. From 1988 through 2004, the District provided oversight for the investigation and cleanup of over 2,500 UST sites. The District's fuel leak program became nationally known for its proactive and innovative approaches and influenced the direction of the state's UST cleanup program. By the time the District transferred the program to the Santa Clara County Department of Environmental Health (DEH) in July 2004, less than 400 fuel leak cases remained open.

Groundwater pumping accounted for about half of the total water use by the mid-1980s. The rate of inelastic land subsidence was reduced to about 0.01 feet per year compared to 1 foot per year in 1961. To provide a reliable source of supply, the District contracted with the federal government for the delivery of 152,500 AF per year of imported water from the Central Valley Project (CVP) through the San Felipe Project. The county's first delivery of CVP water took place in 1987, but it was not until 1989 that the District's Santa Teresa WTP began operating to fully utilize this additional source of imported supply.

The extended drought from 1987 to 1992 led to expanded District conservation programs, including more aggressive outreach campaigns and rebate programs for residents and businesses installing water saving fixtures. In the mid-1990s, the District began offering financial and technical assistance to entities interested in expanding the use of recycled water. This included agreements with the cities of San Jose, Santa Clara, and Milpitas (the South Bay Water Recycling Program); Gilroy and Morgan Hill (the South County Regional Wastewater Authority); Sunnyvale; and Palo Alto and Mountain View. This commitment to supplementing local supplies with recycled

[15] Now the State Division of Drinking Water.

water was strengthened in 1997 when the District Board established a policy supporting the expanded use of recycled water and setting numeric targets for future recycled water use.

Nitrate and methyl tertiary butyl ether (MTBE) emerged as significant groundwater quality threats in the 1990s. Elevated nitrate from agriculture, septic systems, and animal wastes was identified as early as the 1950s; however, the concern became more acute in the early 1990s as an increasing number of wells were impacted. The District developed a comprehensive Nitrate Management Plan, which included public outreach programs to educate the residents on fertilizer use, septic system maintenance, and well location and construction. The District also offered free nitrate testing for South County residents in 1998. Later efforts included programs to reduce nitrate loading in cooperation with farmers, including programs to evaluate infield nutrient use.

In 1992, California began using oxygenates, primarily MTBE, in gasoline to satisfy federal clean air requirements, the District began investigating the potential for MTBE contamination in 1995, which led to the discovery of MTBE contamination in soil at 292 sites, primarily service stations, and at low concentrations in the District's reservoirs. The District provided the first guidelines in the state for owners of LUST sites on how to identify and clean up MTBE releases in 1997. Along with many others, the District's action and leadership in addressing MTBE led to a statewide ban in 2004.

In the 2000s, the District again demonstrated its leadership and commitment to aggressively protecting groundwater resources. Perchlorate contamination at a former flare manufacturing facility in Morgan Hill was discovered in August 2002, and further site investigation by the responsible party indicated detections in wells several miles to the south. Due to concerns that the contamination could be larger than assumed, the District sampled over 1,000 wells. Related results prompted the Central Coast Water Board to expand and expedite site investigation and cleanup activities. To ensure the safety of South County residents who rely on groundwater for their drinking water, the District also initiated a temporary bottled water program for well owners impacted by perchlorate. The District continues to work with the Central Coast Water Board, the County, the cities of Morgan Hill and Gilroy, and local residents through the Perchlorate Community Advisory Group to assure that the contaminated groundwater is cleaned up as soon as possible.

More recent efforts to ensure long-term water supply reliability include the construction and operation of the District's Silicon Valley Advanced Water Purification Center. This facility, which began operating in 2014 produces up to 8 million gallons per day of purified water by treating tertiary-treated recycled water with microfiltration, reverse osmosis, and ultraviolet light. Purified water is blended with tertiary treated recycled water to lower the salt content of recycled water used for landscape irrigation and industrial uses. This facility supports the District's goal of expanding the use of recycled water, which reduces the demand on groundwater, and sets the stage for the potential recharge of groundwater with purified water.

1.4.2 District Authority

The District is an independent special district formed by the California legislature under the District Act for the primary purpose of providing comprehensive management for all beneficial uses and protection from flooding within Santa Clara County.

1.4.2.1 Authorities Provided by the District Act

Per Sections 4 and 5 of the District Act, the District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District Act gives the Board the ability to adopt ordinances to carry out the District Act, including the objective to protect the county's groundwater resources. One such ordinance regulates the construction and destruction of wells and other deep excavations.[16]

The District Act also provides the District the authority to create zones of benefit, to levy volumetric groundwater charges, and to use those revenues to pay the costs of:

- constructing, maintaining and operating facilities that import water into the county,
- purchasing imported water,
- constructing, maintaining and operating facilities that will conserve or distribute water within the groundwater charge zones, including facilities for groundwater recharge, surface distribution, and water purification and treatment, and
- principal or interest incurred by the District for the previously listed purposes.

Per the District Act, groundwater charges are to be fixed and uniform within each zone, with the rate for agricultural water not to exceed one-quarter of the rate for non-agricultural water. A rate may be subject to proportional increases in production over a prior base period specified by the Board upon finding by the Board that conditions of drought and water shortage require the increases.[17] Proportional rates have not been implemented by the District to date.

1.4.2.2 Authorities Provided by SGMA

In addition to the broad authorities provided by the District Act, SGMA provides several new authorities that would be available upon Board adoption of the 2016 GWMP. Potential new authorities under SGMA include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

Effective programs, investments, and coordination with water retailers have resulted in sustainable groundwater conditions, and the District views ongoing cooperation as the most effective way to address water supply challenges. As an example, during the recent drought, nearly all water retailers supported the District's water use reduction target, which was higher than their state-mandated targets in many cases. Retailer efforts to use treated surface water and reduce pumping in certain areas were instrumental in groundwater level recovery and minimizing the risk of resumed land subsidence.

While groundwater conditions are sustainable due to a strong groundwater management framework and coordination with water retailers, risks to ongoing sustainability include prolonged drought, increased demands, reduced imported water availability, aging infrastructure, and climate change. Continued coordination and partnerships with major pumpers and other local agencies are the preferred way to deal with these and other challenges to groundwater sustainability. However, the regulation of pumping may be needed if these risks threaten to, or produce undesirable results like chronic overdraft, land subsidence, or groundwater quality impacts.

As the agency charged with ensuring groundwater sustainability, the District will further evaluate the new authorities provided by SGMA. The District plans to work with water retailers and other interested stakeholders to identify the specific basin conditions that might trigger the need to control groundwater extraction and the most effective implementation mechanisms. Importantly, authorities related to controlling pumping have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with

[16] Santa Clara Valley Water District Ordinance 90-1.
[17] Santa Clara Valley Water District Act §§26.7 (3)(c).

District regulation of pumping at individual wells must be carefully considered. Working with major pumpers to develop related basin condition triggers and implementation mechanisms will help ensure these authorities can be effectively implemented should they become necessary. The District intends to begin this collaborative analysis in 2017. Potential new authorities under SGMA and related constraints are discussed further below.

Regulation of Groundwater Pumping

Per Water Code Section 10726.4, SGMA authorities related to controlling groundwater pumping include the ability to:

- impose spacing requirements on new well construction to minimize interference,
- impose reasonable operating regulations on existing wells to minimize interference, including requiring extractors to operate on a rotation basis,
- regulate, limit, or suspend groundwater extraction, construction of new wells, enlargement of existing wells, or reactivation of abandoned wells,
- establish groundwater extraction allocations,
- authorize temporary and permanent transfers of groundwater extraction allocations, and
- establish rules to allow unused groundwater extraction allocations to be carried over from one year to another and voluntarily transferred.

While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[18] Property owners and municipalities have rights to the reasonable, beneficial use of groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater. The authorities granted by SGMA to regulate groundwater pumping have not been tested.

Local agencies evaluating the regulation of pumping must also consider the land use authority of cities and counties, which is not superseded by SGMA.[19] For example, any action to control extractions must be consistent with the city or county general plan unless there is insufficient sustainable yield in the basin to serve a designated land use. Groundwater extraction transfers are also subject to applicable city and county ordinances.

Collection of Various Fees

Water Code Section 10730.2 allows Groundwater Sustainability Agencies to impose fixed fees and volumetric fees, including, but not limited to, fees that increase based on the quantity of groundwater produced, the year in which the groundwater extraction commenced, and impacts to the basin. Fees imposed pursuant to SGMA must comply with the applicable provisions of Proposition 218.

The District will evaluate the various fees that can be collected pursuant to SGMA to determine if they further sustainable groundwater management. Of particular interest are fixed fees, which are used by many water retailers and may reduce volatility in revenue and rates. The District intends to evaluate the feasibility of using a fixed fee, which will include consideration of related Proposition 218 issues, in calendar year 2017.

Implementation of New SGMA Authorities

The analyses identified above will help determine whether new SGMA authorities are necessary and/or beneficial in

[18] California Water Code §§10720.5(b) and 10726.8(b).
[19] California Water Code §§ 10726.4, 10726.8(f), and 10726.9.

maintaining sustainable groundwater conditions into the future. The analyses would also identify related implementation mechanisms that would be needed, such as Board ordinance. Any proposed changes to the District's rate structure would be identified as part of the annual rate setting process. This open and transparent process includes documentation of proposed rates in the District's annual Protection and Augmentation of Water Supplies (PAWS) Report, notification to all owners of groundwater producing facilities, discussion with Board Advisory Committees and water retailers, and public hearings prior to rate adoption.

1.4.3 District Management Structure

The District is governed by an elected Board of Directors. The Board is comprised of seven members, each elected from equally-divided districts drawn through a formal process. The purpose of the Board, on behalf of Santa Clara County, is to provide Silicon Valley safe, clean water for a healthy life, environment and economy.

District Board of Directors

There are three Board Appointed Officers (BAOs): District Counsel, Clerk of the Board, and Chief Executive Officer (CEO). The executive management team is responsible for implementing the Board policies and running the day-to-day operations. At the staff level, there are three District chiefs (Chief Administrative Officer, Chief Operating Officer for Watersheds and Chief Operating Officer for the Water Utility Enterprise) that report to the CEO. The Water Utility Enterprise includes four divisions: Water Supply, Raw Water Operations and Maintenance, Water Utility Operations and Maintenance, and Water Utility Capital. The divisions and units within the Water Utility Enterprise manage District programs, facilities, and planning to ensure reliable water supplies for the county.

1.4.4 Water Utility Enterprise Financial Overview

Funding sources for the Water Utility Enterprise include charges for groundwater production, treated water, recycled water, and surface water, along with property taxes, interest earnings, reimbursements, and grants. These funds are used to operate and maintain the District's complex water supply infrastructure network, maintain water supply sources and water rights, and make capital improvements as needed to ensure water supply reliability. The Water Utility Enterprise operations and capital budget for fiscal year 2016-17 is $359 million. Detailed information on Water Utility Enterprise funding is available through the District's PAWS report, which is prepared each year in February and posted on the District website. The District's overall budget is also available at www.valleywater.org.

1.4.5 Relation to Other District Programs and Plans

The 2016 GWMP provides information on basin conditions and documents groundwater management goals, strategies, related activities, and metrics for desired basin outcomes. This information supports other District planning efforts including the:

- Urban Water Management Plan (UWMP) that evaluates water supply reliability over a 25-year period
- Water Supply Master Plan that documents the water supplies, infrastructure, investments, and operating strategies needed to ensuring long-term water supply reliability
- Annual Protection and Augmentation of Water Supplies (PAWS) Report that presents the basis for recommended groundwater production charges in accordance with the District Act
- Salt and Nutrient Management Plans that assess the loading of salt and nutrients to groundwater and identify related management strategies
- Planning to address specific water management issues that could affect groundwater management

As required by the Water Code, the District will update the GWMP at least every five years. Updating the GWMP prior to updates of the Urban Water Management Plan would provide optimal flow of information on groundwater conditions and operational considerations to assist with the evaluation of future water supply conditions. The UWMP is also on a five-year update cycle, with the next update due in 2020. The Water Supply Master Plan builds on the information in the both the GWMP and UWMP to update the District's long-term water supply strategy, and is also on a five-year update cycle.

1.5 GROUNDWATER MANAGEMENT PARTNERS AND STAKEHOLDERS

Although the District is the groundwater management agency in Santa Clara County per the District Act and is now the GSA under SGMA, many other agencies have a significant role, including local water retailers, land use agencies, and regulatory agencies.

1.5.1 Water Retailers

Local water retailers maintain facilities to distribute water directly to local residents and businesses and meet applicable regulatory standards established by the U.S. Environmental Protection Agency (USEPA) and California Division of Drinking Water (DDW). In addition to groundwater, local retailers may also serve treated water purchased from the District or potable water supplied by the SFPUC. Several retailers also maintain local surface water rights and distribute recycled water for non-potable uses. The maintenance of these supplies is critical to maintaining overall water supply reliability in the county. Every five years, the District and local water retailers coordinate to develop individual agencies' Urban Water Management Plans that evaluate water supply reliability over a 20-year period. For water retailers using groundwater, these plans show a continued reliance on groundwater in the future.

As the primary groundwater pumpers in the county, water retailers play a major part in influencing groundwater conditions through their operations. Effective District/retailer coordination with the shared goal of protecting groundwater resources has resulted in sustainable groundwater conditions over many decades. As noted previously, the ability of water retailers to significantly reduce groundwater pumping in 2015 through source shifts and water use reduction efforts was instrumental in groundwater recovery despite continued dry conditions. Ongoing strong partnership and collaboration will be essential to meet future water supply challenges.

The District and water retailers collaborate closely on operations as well as long-term planning, and meet quarterly through the Water Retailers Committee. The Water Retailers Committee has established the following subcommittees, which meet regularly to discuss specific topics in more detail:

- Water Supply
- Groundwater
- Water Quality
- Treated Water
- Fluoridation
- Water Conservation
- Recycled Water
- Finance
- Emergency Management
- Communications

1.5.2 Land Use Agencies

Land use agencies, including Santa Clara County and local cities, provide land use planning and permitting functions affecting water demand and land use, which may impact groundwater quantity and quality. General Plans adopted by land use agencies reflect each agency's policy with regard to future development and many of these plans contain goals to address water supply reliability and the protection of water resources, including groundwater. Land use agencies also review and approve Water Supply Assessments for developments meeting certain growth requirements. The District reviews General Plans and Water Supply Assessments to ensure alignment with District policy, water supply goals, and planning assumptions.

Land use agencies permit and inspect hazardous material and waste storage and handling facilities through the fire departments. The County DEH also oversees the leaking underground fuel tank cleanup program, issues permits for septic systems, and regulates drinking water systems with 5 to 14 connections. Local land use agencies also administer stormwater management programs in compliance with National Pollutant Discharge Elimination System (NPDES) requirements.

1.5.3 Local, State, and Federal Agencies

The District relies on partnerships with regulatory agencies to protect groundwater resources. Agencies, including the State Water Resources Control Board, the Department of Toxic Substances Control (DTSC), and the USEPA, regulate the cleanup of contaminants in groundwater. Regional Water Quality Control Boards (Water Boards) also define the beneficial uses and water quality objectives for groundwater basins. Two Water Boards have regulatory jurisdiction over water resources in Santa Clara County, the San Francisco Bay Water Board and the Central Coast Water Board.

Figure 1-7 shows the general authorities, roles, and functions of these various agencies with regard to groundwater resources. It should be noted that this figure is intended to provide a general overview rather than a comprehensive list of individual agencies and functions.

Figure 1-7. Overview of Groundwater Management Roles

U.S. Environmental Protection Agency

- Establishes federal drinking water standards for public water systems
- Regulates cleanup of Superfund sites

California Environmental Protection Agency
Includes: State Water Resources Control Board, Regional Water Quality Control Boards, Division of Drinking Water, Department of Toxic Substances Control

- Implements environmental protection laws that ensure clean air, clean water, clean soil, safe pesticides and waste recycling and reduction
- Allocates water rights and adjudicates water right disputes
- Develops statewide water protection plans and establishes water quality standards
- Regulates groundwater if local management efforts are inadequate under the Sustainable Groundwater Management Act (SGMA)
- Establishes state drinking water standards and regulates public drinking water systems
- Permits recycled water projects
- Regulates facilities that treat, store, and dispose of hazardous waste
- Regulates cleanup of contaminated sites

California Department of Water Resources

- Develops regulations, evaluates local groundwater sustainability planning efforts, and provides technical assistance related to SGMA
- Operates the State Water Project
- Supports local and regional water management through technical and financial assistance
- Guides development and management of water resources

Santa Clara Valley Water District

- Manages the Santa Clara and Llagas Subbasins in Santa Clara County per the District Act and SGMA
- Implements programs to protect and augment groundwater
- Conducts managed recharge and in-lieu recharge programs to offset groundwater pumping
- Permits wells and other deep excavations
- Coordinates with water retailers, land use and regulatory agencies, adjacent water agencies, and interested stakeholders

Water Retailers

- Maintain facilities to deliver water to customers
- Maintain surface water rights and/or other sources of supply
- Ensure compliance with drinking water standards
- Reduce demands during shortages and modify operations to protect groundwater

Land Use Agencies

- Develop General Plans and review Water Supply Assessments
- Permit land use and administer stormwater management programs
- Permit hazardous material storage and handling facilities
- Oversee cleanup of leaking underground tanks (County)
- Regulates septic systems and small water systems (County)

Well Owners and the Community

- Maintain, construct, and properly destroy wells (well owners)
- Use water wisely and minimize the introduction of contaminants

1.5.4 Other Stakeholders

Private well owners, non-governmental organizations, and the public are also important partners in protecting groundwater supplies. Private well owners are responsible for constructing, maintaining, and properly destroying wells so they do not act as vertical pathways for contaminants. The community also has a role in protecting groundwater supplies by using water wisely and helping reduce the introduction of contaminants from activities at the land surface.

There are also numerous statewide and national organizations engaged in issues related to groundwater, including the Association of California Water Agencies and the California Urban Water Agencies. The District works with these agencies and others on various proposals to protect groundwater resources.

The District will continue to work closely with local partners and the public using the following methods:

- Regularly scheduled meetings, including the Water Retailer Committee and Groundwater Subcommittee
- Publicly-noticed Board meetings
- Review and coordination with land use agencies on land use and development proposals as well as the development of guidelines related to specific issues (e.g., stormwater infiltration, graywater, septic systems)
- Technical coordination with regulatory agencies on contaminant release sites and policies related to groundwater
- Coordination with basin stakeholders and regulatory agencies on long-term resource planning efforts
- Outreach, including the development of fact sheets and web information and interaction with the public at open houses and other events

1.6 PUBLIC OUTREACH FOR THE 2016 GROUNDWATER MANAGEMENT PLAN

Under SGMA, Alternatives are not subject to the same outreach required during development and adoption of a GSP. However, the District has worked to provide interested stakeholders opportunities for input on the 2016 GWMP.

The District presented information on the 2016 GWMP at several meetings of the Water Retailers Committee, as well as several joint meetings of the Water Retailers Water Supply and Groundwater Subcommittees. The District has also discussed planned SGMA compliance with agencies in adjacent subbasins, including the Alameda County Water District, San Benito County Water District, and San Mateo County.

The District provided summary information on SGMA and related District plans in outreach sent to all well owners within the county in June 2016. In July 2016, the District notified water retailers, land use agencies, water management agencies in adjacent subbasins, and interested stakeholders of the District intent to prepare an Alternative to a GSP. The notice also referenced two upcoming public informational meetings, notified stakeholders of the ability to be added to an interested stakeholders list, and provided web and staff contact details for those seeking more information. The District held two public informational meetings on the 2016 GWMP: July 21, 2016 at the District headquarters and August 2, 2016 at the City of Morgan Hill Community Center.

Agenda items for regularly-scheduled and publicly-noticed Board meetings October 13, 2015, April 26, 2016, June 22, 2016, and November 8, 2016 stated the District's intent to prepare the 2016 GWMP as an Alternative under SGMA. A public hearing on the 2016 GWMP was held at a regularly-scheduled Board meeting and public notice included advertisements in local newspapers. Related notices, Board resolutions, comments received during the public hearing, District response to comments, and environmental documentation are included in Appendix A.

1.7 PLAN CONTENT AND ORGANIZATION

This 2016 GWMP brings together important information on groundwater management goals, strategies, and related activities in Santa Clara County. The GWMP is intended to present information that will be useful to water retailers, land use planning agencies, agencies in adjacent subbasins, and community members interested in groundwater. The 2016 GWMP includes the following chapters:

- **Chapter 2 – Santa Clara Subbasin Description**: This chapter provides an overview of the Santa Clara Subbasin and current conditions.
- **Chapter 3 – Llagas Subbasin Description**: This chapter provides an overview of the Llagas Subbasin and current conditions.
- **Chapter 4 – Water Supplies, Demands, and Budget**: This chapter describes the District's conjunctive water management system, historical and current groundwater demands, and groundwater budgets.
- **Chapter 5 – Sustainable Management Criteria**: This chapter describes the sustainability goals and sustainability criteria to measure the effectiveness of the sustainability goals.
- **Chapter 6 – Basin Management Programs and Activities**: This chapter describes District programs and activities that support the sustainability goals.
- **Chapter 7 – Groundwater Monitoring and Modeling**: This chapter summarizes District programs to monitor changes in groundwater levels, groundwater quality, land subsidence, and surface water, as well as groundwater flow models.
- **Chapter 8 – Next Steps**: This chapter describes future reporting related to the GWMP and discusses potential approaches to consider if the outcome measures indicate improvement is needed or to address future risks and changing conditions. It also includes recommendations for further work.

Chapter 2 – Santa Clara Subbasin Description

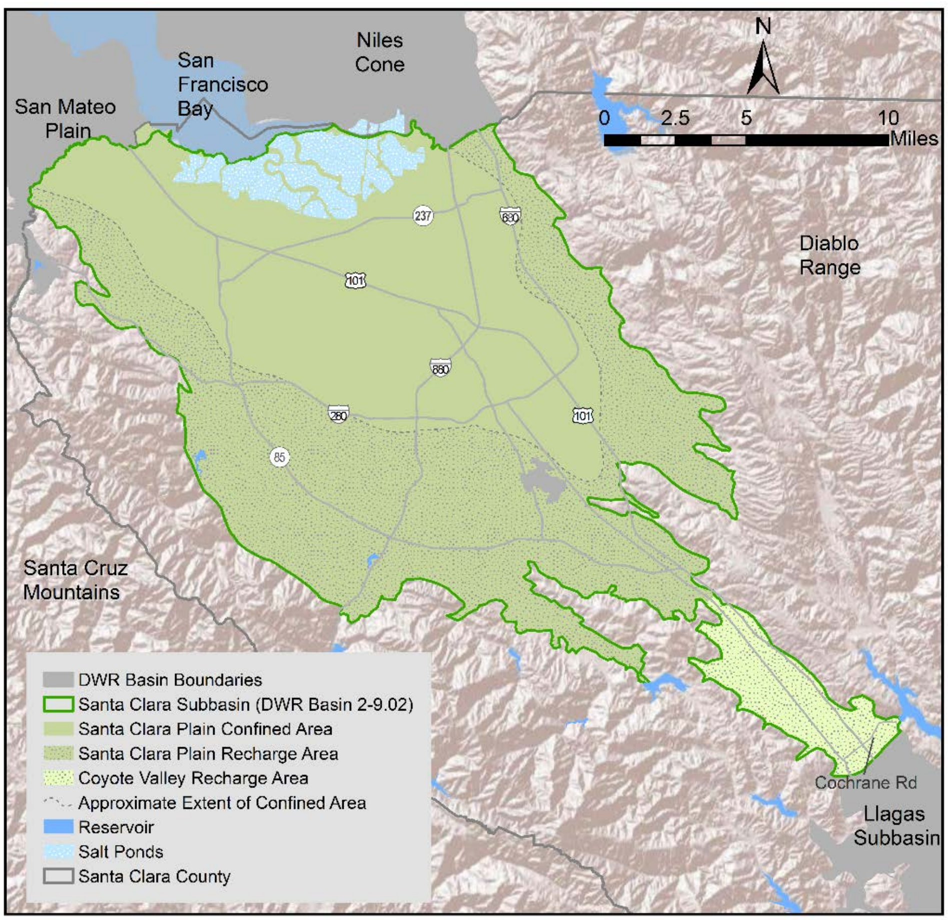
CHAPTER 2 – SANTA CLARA SUBBASIN DESCRIPTION

This chapter describes the Santa Clara Subbasin, including the physical setting and characteristics, and conditions related to groundwater elevation, water quality, land subsidence, groundwater/surface water interaction, and salt water intrusion.

2.1 BASIN SETTING

The Santa Clara Subbasin (DWR Basin 2-9.02), which includes the Santa Clara Plain and Coyote Valley, is located within the California Coast Ranges physiographic province between the San Andreas and Hayward Faults at the southern end of the San Francisco Bay (Figure 2-1). The subbasin underlies a relatively flat valley and consists of unconsolidated alluvial sediments. The Santa Clara Subbasin is part of Basin 2-9, which extends beyond Santa Clara County into San Mateo, Alameda, and Contra Costa counties and beneath San Francisco Bay, which is fringed and underlain by the estuarine San Francisco Bay mud.[20] Due to different hydrogeologic, land use and water supply management characteristics, the District further subdivides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley.

Figure 2-1. Santa Clara Subbasin



[20] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.1.1 Lateral Subbasin Boundaries

The Santa Clara Subbasin covers a surface area of 297 square miles and forms a northwest-trending, elongated valley bounded by the Santa Cruz Mountains to the west and the Diablo Range to the east. The basis for the lateral boundary delineation shown in Figure 2-1 is the geologic, hydrologic and topographic features in the subbasin. The western and eastern subbasin boundaries are the geologic contact between permeable to semi-permeable alluvial sediments within the Santa Clara Valley and the impermeable bedrock of the adjacent mountain ranges. These impermeable sediments include the Mesozoic marine formations and the Franciscan Assemblage of the Santa Cruz Mountains, and Franciscan greywacke and serpentinite bodies of the Diablo Range. The northern boundary with the San Francisco Bay is hydrologic. To the northwest and northeast, the subbasin borders the San Mateo and Niles Cone Subbasin, respectively, at institutional boundaries formed by county boundaries. The southern boundary with the Llagas Subbasin is the Coyote Creek alluvial fan in the Morgan Hill area, which forms a topographic and hydrologic divide between the groundwater and surface water flowing to the San Francisco Bay and water flowing to the Monterey Bay. The groundwater divide is approximately located at Cochrane Road in Morgan Hill. Based on observed water level data, the boundary moves as much as a mile to the north or south depending on local groundwater conditions.

The Santa Clara Plain covers 280 square miles, extending from southern San Francisco Bay to the Coyote Narrows, near Metcalf Road. The Coyote Valley extends from the Coyote Narrows to the boundary with the Llagas Subbasin. The Coyote Valley is much smaller than the Santa Clara Plain, covering a surface area of 17 square miles.

2.1.2 Recharge Areas

Recharge within the Santa Clara Subbasin generally occurs along the margins and southern portion of the subbasin where coarse-grained sediments predominate. The recharge area includes the alluvial fan and fluvial deposits along the edge of the subbasin where high lateral and vertical permeability allow surface water to infiltrate the aquifers. The percolation of surface water in recharge areas replenishes unconfined groundwater within the recharge area and contributes to the recharge of principal aquifers in the confined area through subsurface flow.

The Santa Clara Plain has two hydrogeologic areas, the recharge (unconfined) and confined areas. The confined area is located in the central portion where a laterally extensive, low permeability aquitard that restricts the vertical flow of groundwater and contaminants. The confined area boundary is approximate and is a simplification of natural conditions based on the extent of artesian wells.[21] There is no laterally extensive aquitard in the Coyote Valley, with generally high lateral and vertical permeability throughout the area.

2.1.3 Principal Aquifers and Aquitards

The Santa Clara Subbasin is a trough-like depression filled with Quaternary alluvium deposits of unconsolidated gravel, sand, silt and clay that eroded from adjacent mountain ranges by flowing water and were deposited into the valley (Figure 2-2). The alluvium comprises interfingering alluvial fans, stream deposits and terrace deposits.

Helley and Lajoie divided the valley fill alluvium into two major Quaternary deposits: Holocene (younger than 10,000 years old) and Pleistocene deposits (from 1.8 Million to 10,000 years old).[22] The Holocene deposits consist of the most recent sediments deposited along major stream courses and bay mud deposits along the San Francisco Bay. The Holocene alluvial sediment consists of mainly of clay, silt and sand occurring in discontinuous lenses. The majority of the subbasin alluvium is older, Pleistocene deposits of unconsolidated and interfingered lenses of clay,

[21] Clark, Ground Water in Santa Clara Valley, California, 1924.

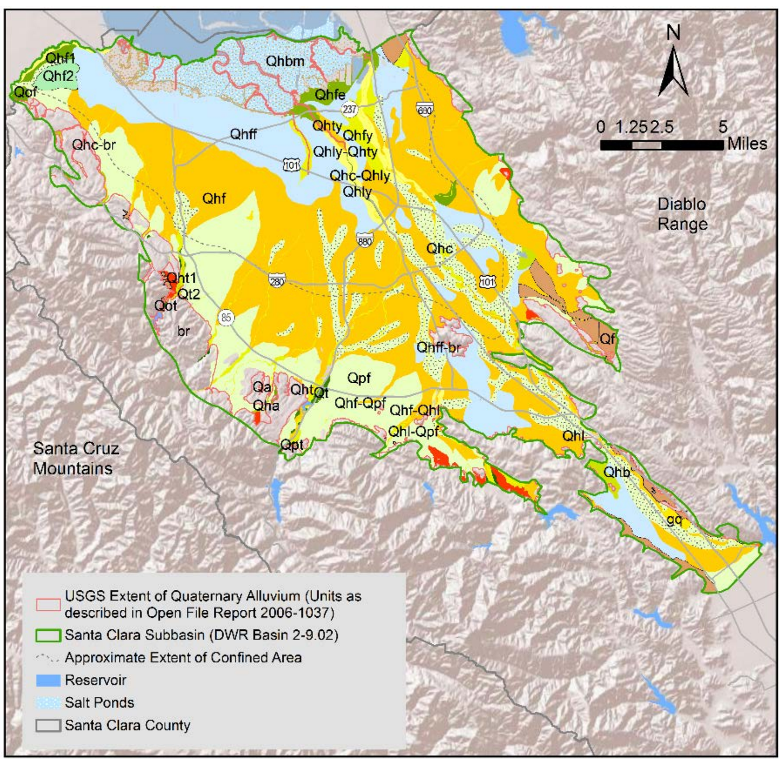
[22] Helley and Lajoie, Flatland Deposits of the San Francisco Bay Region, California: Their Geology and Engineering Properties and Their Importance to Comprehensive Planning, 1979.

silt, sand and gravel. The base of the Pleistocene deposits overlies the Santa Clara Formation in some areas of the subbasin, such as near Stevens Creek Reservoir. The Santa Clara Formation is composed of slightly or semi-consolidated alluvial deposits washed down from the upper mountainous area and deposited along the foothills beneath the unconsolidated young alluvial sediments of the subbasin.[23] A recent USGS study[24] indicated that Late Pleistocene alluvium is exposed on the heads of the alluvial fans, particularly on the west side of the valley.

The thickness of aquifer materials in the Santa Clara Plain ranges from about 150 feet near the Coyote Narrows to more than 1,500 feet in the interior of the subbasin. The alluvium thins towards the western and eastern edges of the Santa Clara Plain. The central portion of the Santa Clara Plain contains a laterally extensive, low permeability aquitard that restricts the vertical flow of groundwater. This major aquitard varies in thickness from 20 to 100 feet and typically occurs at depths between 100 to 200 feet below ground surface,[25] separating shallow and principal aquifer zones. Shallow aquifer zones generally refer to aquifers that occur within 150 feet of ground surface, while principal aquifer zones generally occur at depths below 150 feet.[26] The primary confined aquifers exist at depths between 200 and 1,000 feet.[27]

The Coyote Valley is mainly composed of thick alluvial sand and gravel deposits with interbedded thin, discontinuous clays. The aquifer sediments overlying the Santa Clara Formation vary in thickness from a few feet along the west side of the valley to more than 400 feet along the east side. Cross-sections of the Santa Clara Subbasin, including the Santa Clara Plain and Coyote Valley are shown in Figures 2-3 through 2-5.

Figure 2-2. Quaternary Alluvium Geologic Map of the Santa Clara Subbasin



[23] Dibblee, Preliminary Geologic Map of the San Jose East Quadrangle, Santa Clara County, California, 1972.
[24] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.
[25] SCVWD Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, 1989.
[26] Iwamura, Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.
[27] Carroll, 1991; Iwamura, 1995.

Figure 2-3. Santa Clara Subbasin Cross-Section Locations

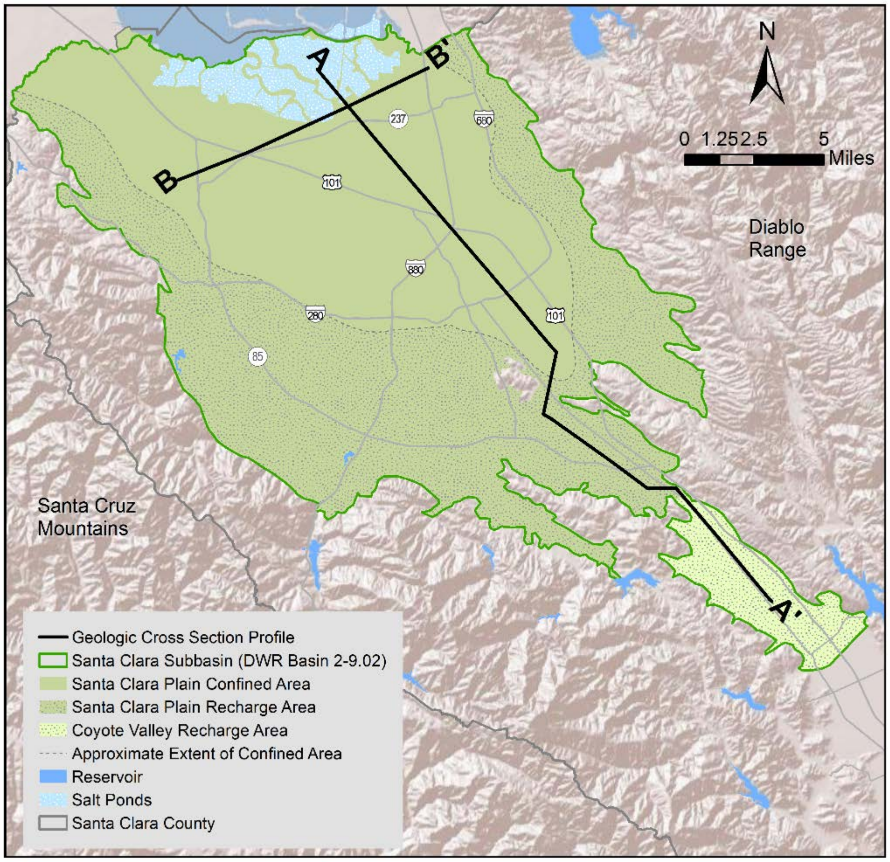


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Figure 2-4. Santa Clara Subbasin Longitudinal Cross-Section

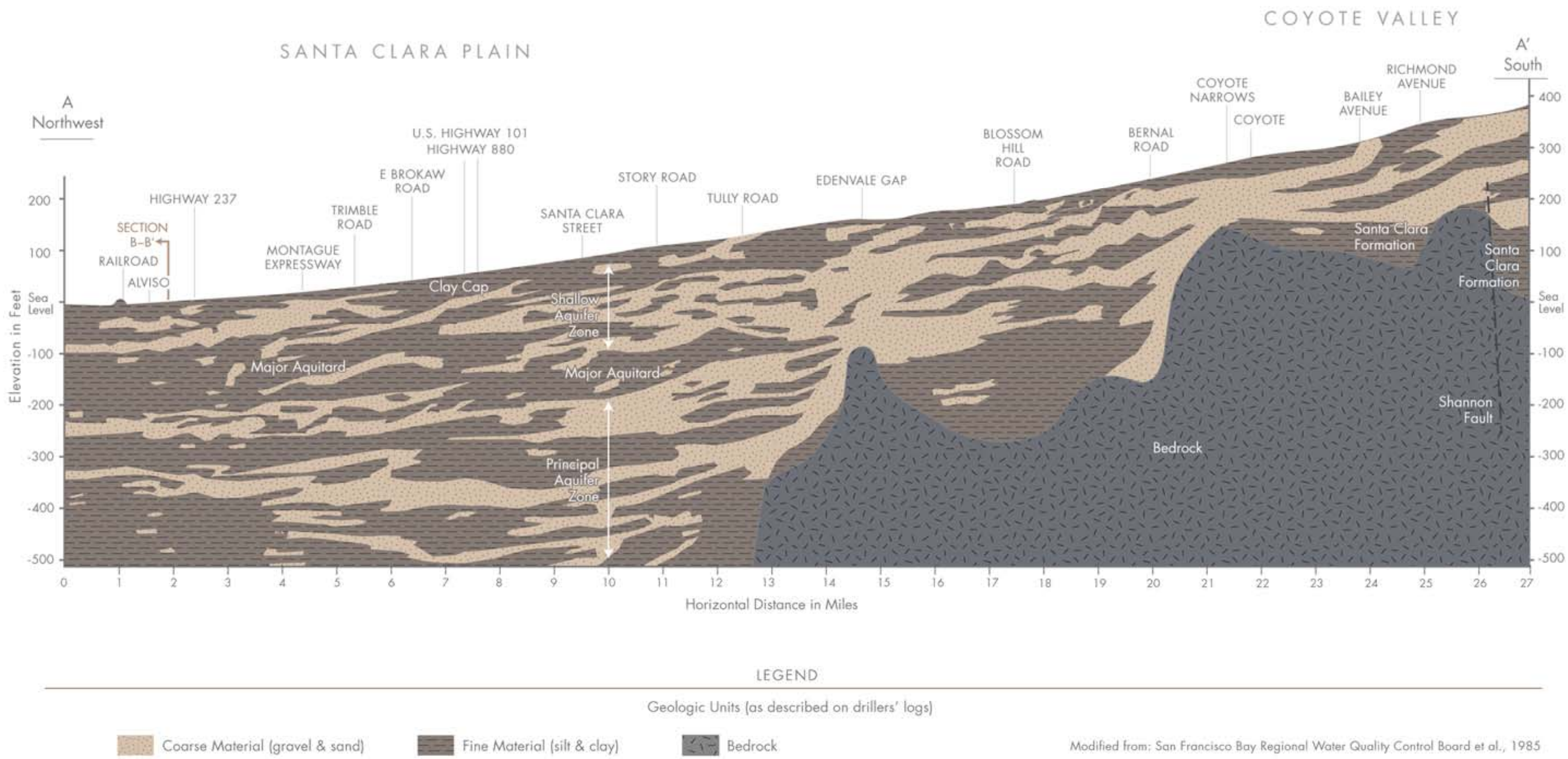
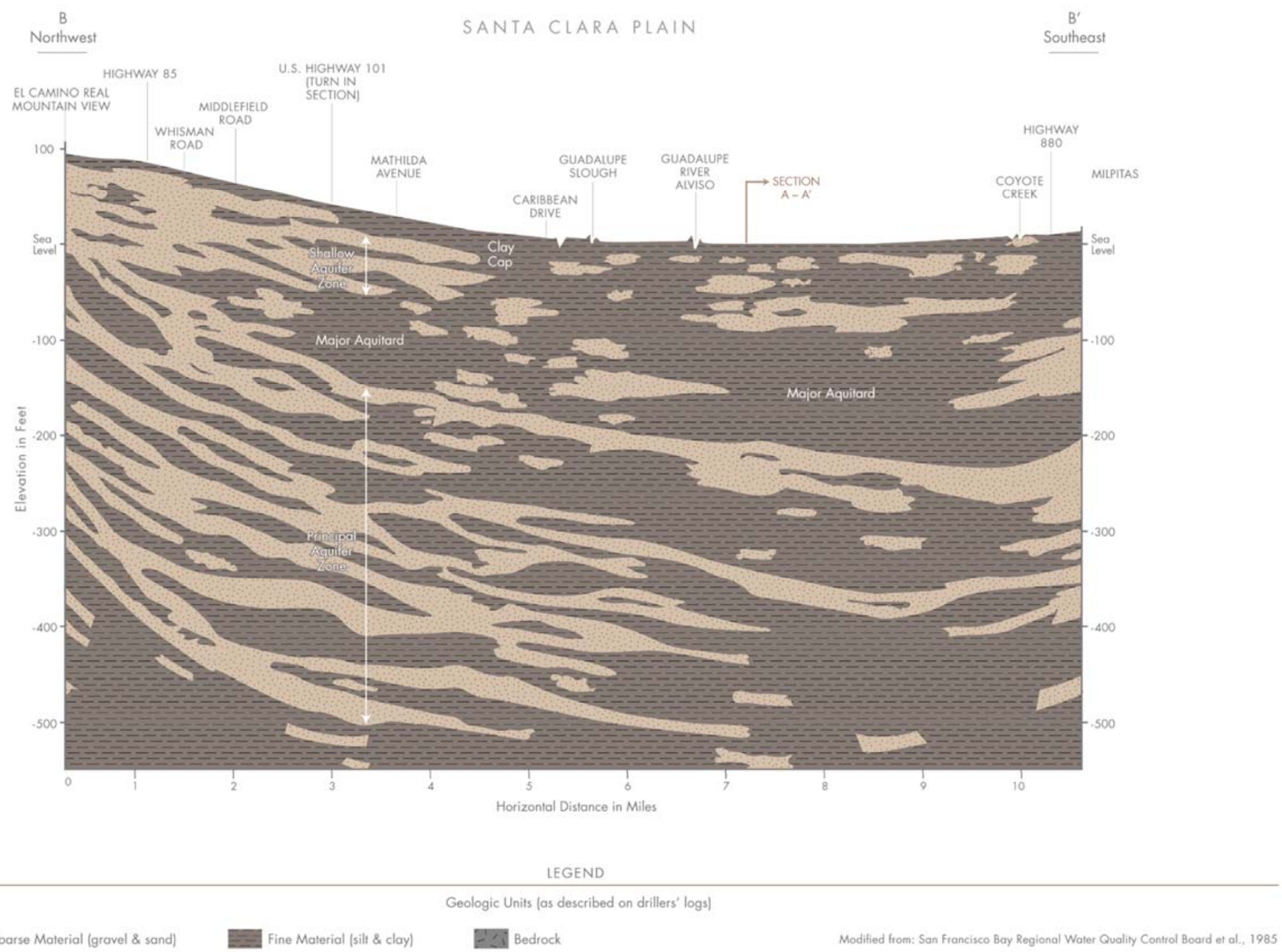


Figure 2-5. Santa Clara Subbasin Transverse Cross-Section

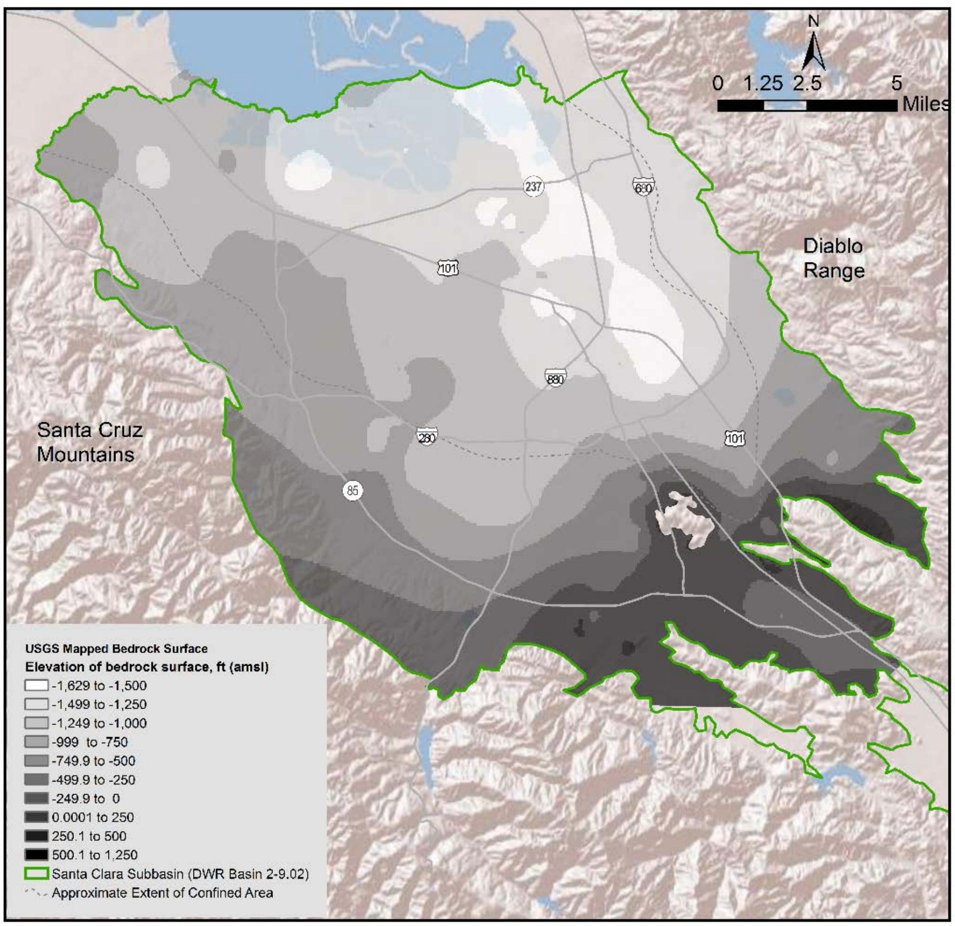


2.1.4 Subbasin Bottom

The bottom of the Santa Clara Subbasin is the contact between the unconsolidated alluvial sediments and impermeable bedrock forming an irregular surface exposed at different depths. It can be difficult to differentiate the Santa Clara Formation (which may be slightly to semi-consolidated) from the unconsolidated overlying alluvial sediments based on driller's logs. Water supply wells completed at greater depths have encountered bedrock. Limited well data indicate the boundary between unconsolidated sediments and bedrock ranges from about 150 to 200 feet near the Coyote Narrows to about 1,500 feet in the interior of the subbasin. This is supported by deep wells constructed by the District and the USGS.[28] Previous study[29] indicates a maximum alluvial thickness is in excess of 1,500 feet, including the Santa Clara Formation. The depth to bedrock decreases towards the western and eastern edges of the subbasin.

A recent USGS report[30] presents more detailed bedrock surface information for the Santa Clara Plain (Figure 2-6) based on 26 wells reaching bedrock, seismic reflection profiles, refraction profiles, and the elevation of mapped depositional contacts of alluvium and bedrock.

Figure 2-6. Santa Clara Plain Bedrock Surface



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[28] Newhouse et al., Geologic, Water-Chemistry, and Hydrologic Data from Multiple-Well Monitoring Sites and Selected Water-Supply Wells in the Santa Clara Valley, California, 1999–2003, 2004.

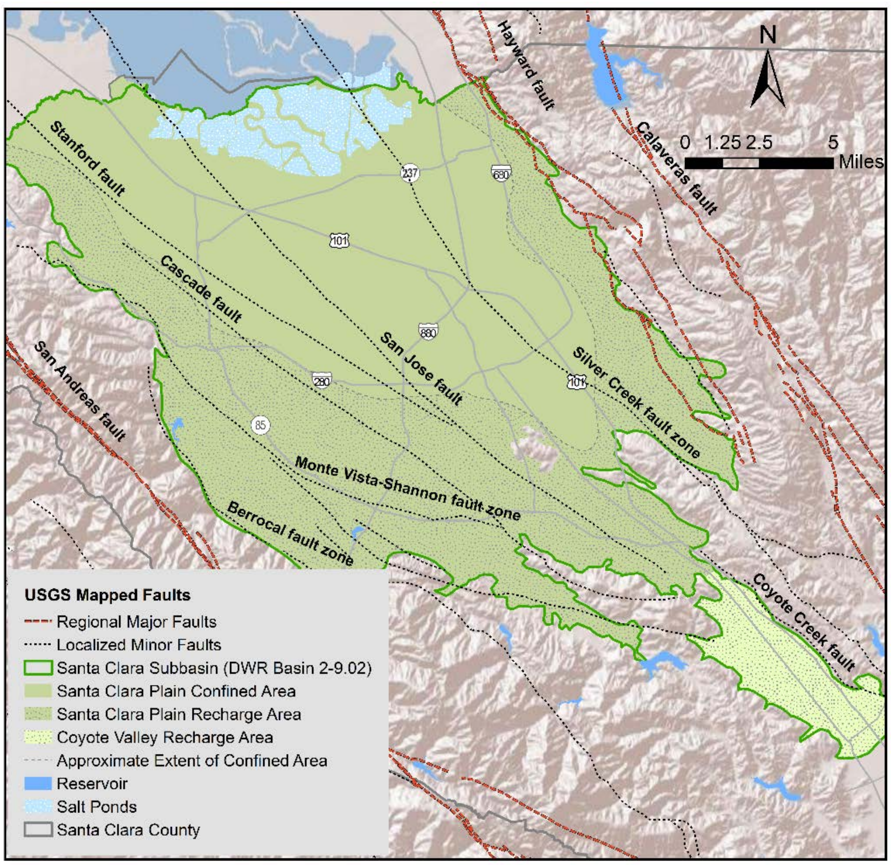
[29] Iwamura, Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.

[30] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.1.5 Major Faults

The major faults in Santa Clara County are the San Andreas and Hayward/Calaveras faults that helped form the Santa Clara Subbasin by upthrusting adjacent mountains. These are right-lateral reverse oblique faults that remain active, creating significant displacement and deformation.[31] Much of the fault network that creates the structural depression in the Franciscan bedrock below the Santa Clara Subbasin is concealed beneath the overlying unconsolidated alluvium.[32] Several secondary faults, including strike slip, oblique and reverse faults are also present. These secondary faults, including but not limited to Silver Creek, San Jose, Stanford, Berrocal Monte-Vista, Shannon, Sargent, and Coyote Creek faults, help accommodate deformation from the major faults.[33] While some studies have suggested that the Silver Creek Fault impedes groundwater flow,[34] previous study in the area by Iwamura (1995) and observed water level data does not substantiate this (Figure 2-7).

Figure 2-7. Location of Major Fault Systems



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[31] Simpson et al., Seismicity and the Major Strike-Slip Faults Bordering the Santa Clara Valley, California, 2005.
[32] Schmidt and Bürgmann, Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California, from a Large Interferometric Synthetic Aperture Radar Data Set, 2003.
[33] Simpson et al., Seismicity and the Major Strike-Slip Faults Bordering the Santa Clara Valley, California, 2005.
[34] USGS, Physical Subdivision and Description of the Water-Bearing Sediments of the Santa Clara Valley, California, 2015.

2.2 SUBBASIN CONDITIONS

This section describes Santa Clara Subbasin conditions with regard to groundwater elevations, flow, quality, land subsidence, surface water/groundwater interaction, and salt water intrusion.

2.2.1 Groundwater Elevation and Flow

Groundwater movement in the Santa Clara Subbasin generally follows topographical and surface water patterns, flowing to the north/northwest toward the interior of the subbasin and San Francisco Bay. Groundwater also moves toward areas of intense pumping at the local scale. Groundwater occurs at different depths in the unconfined aquifer throughout the subbasin, and under artesian conditions in the Santa Clara Plain confined aquifer.

In the Santa Clara Plain, regional groundwater elevations are typically highest near the margins, with elevations decreasing in the subbasin interior. Several large cones of depression are present within the confined area due to concentrated pumping. Except during periods of extended drought, the vertical gradient in much of the confined area is upward. The gradient in the recharge area and near the confined area/recharge area boundary is downward. Regional groundwater elevations in the Coyote Valley are typically highest at the groundwater divide/Llagas Subbasin boundary, with a downward vertical gradient.

The groundwater elevation contour maps depict the groundwater table or potentiometric surface for spring 2012 (Figure 2-8) and fall 2012 (Figure 2-9) for the principal aquifer zone of the Santa Clara Subbasin. As indicated by the contour maps, typical seasonal patterns result in higher groundwater elevations in the spring and lower elevations in the fall. Contour maps for 2012 are included since 2012 represents the most recent year where water levels were not significantly affected by the extended drought. Recent groundwater elevation contours are included in the District's Annual Groundwater Report for 2015. Groundwater levels displayed very atypical patterns in 2015, with higher groundwater elevations in the fall as compared to the spring. This is attributed to effective drought response, including retailer source shifts to treated surface water and significant water use reduction by the community in support of the District's call for water use reduction.

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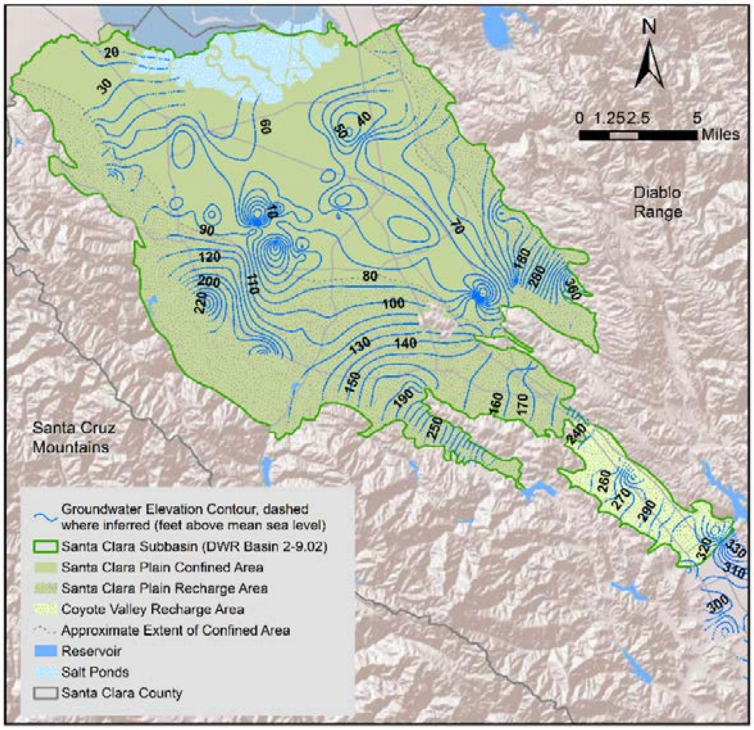
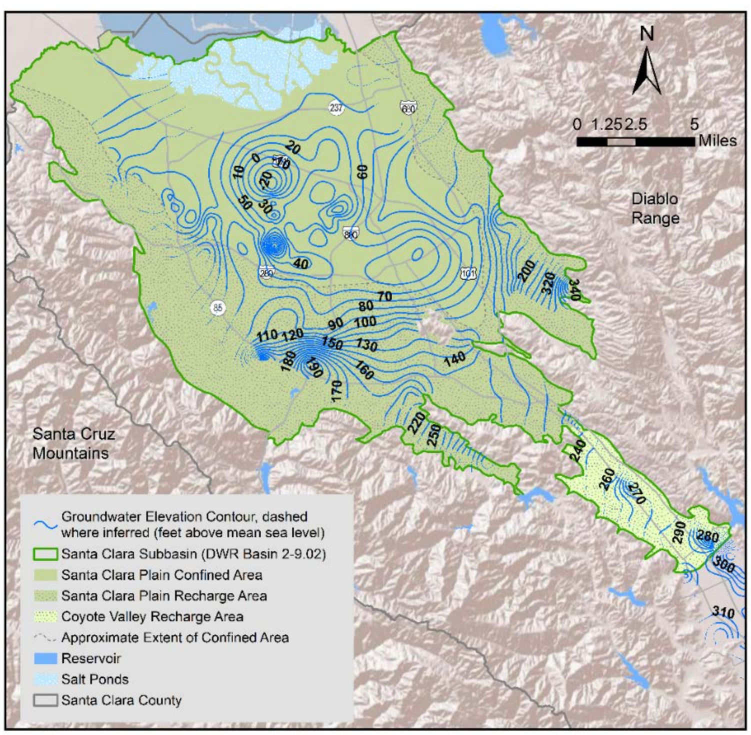
Figure 2-8. Spring 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figure 2-9. Fall 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figures 2-10 and 2-11 are long-term hydrographs for regional index wells in the Santa Clara Plain and Coyote Valley. As indicated on Figure 2-10, there has been a significant rebound in groundwater levels since the mid-1960s due to District efforts to import water and augment groundwater recharge both directly and through in-lieu recharge.

Figure 2-10. Groundwater Elevation in the Santa Clara Plain Regional Index Well (07S01W25L001)

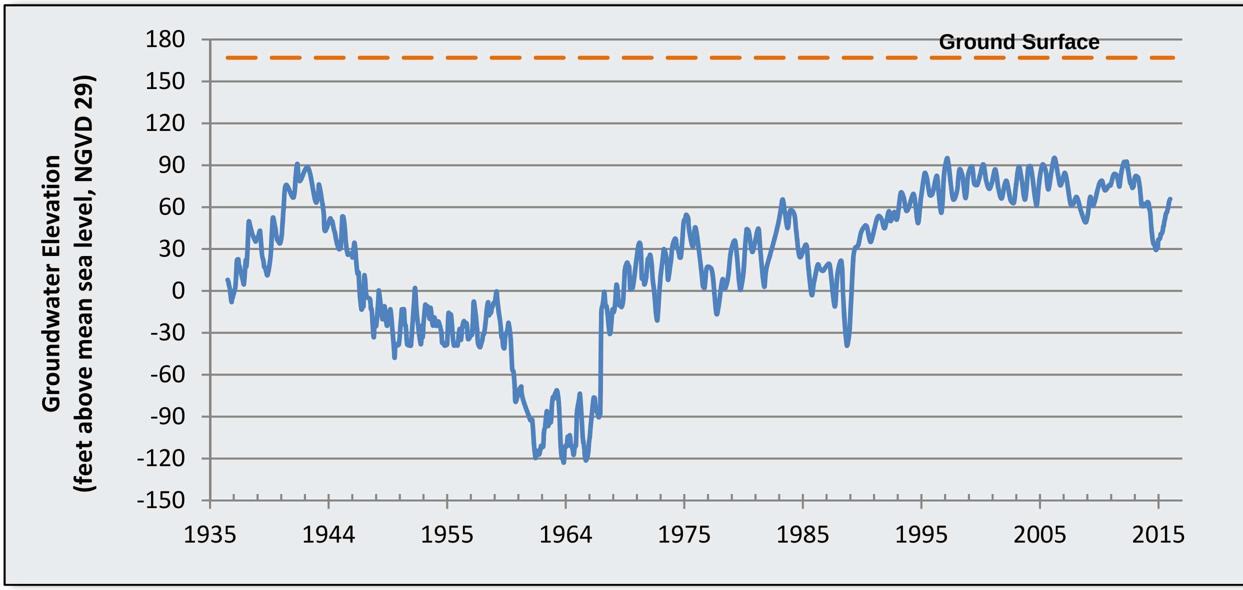
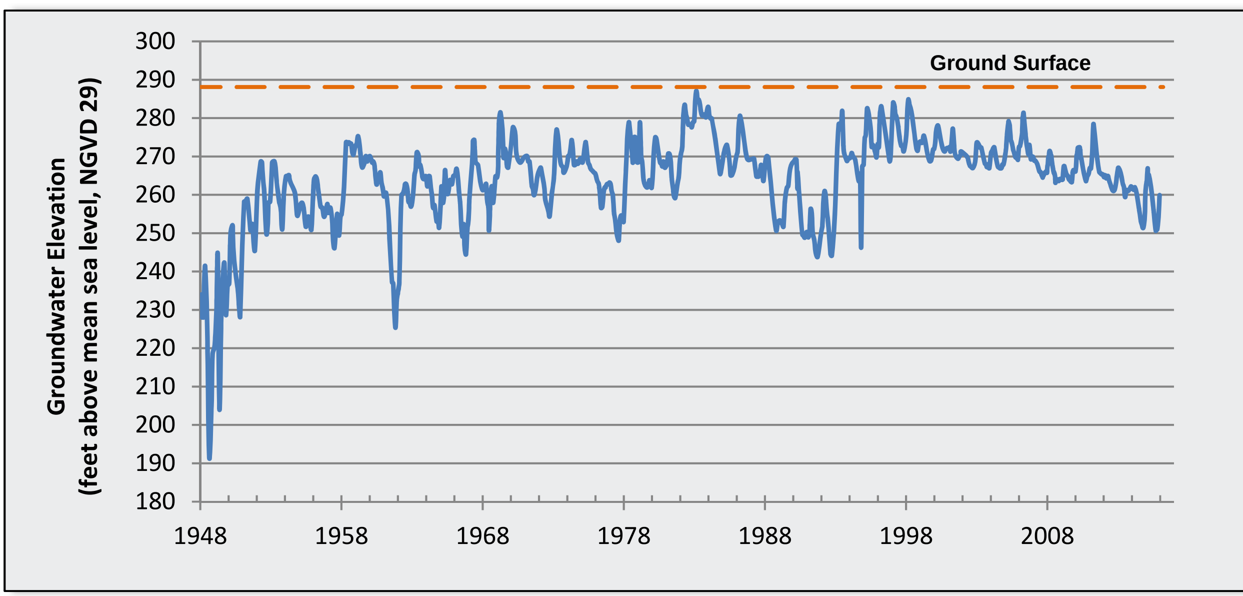


Figure 2-11. Groundwater Elevation in the Coyote Valley Regional Index Well (09S02E02J002)

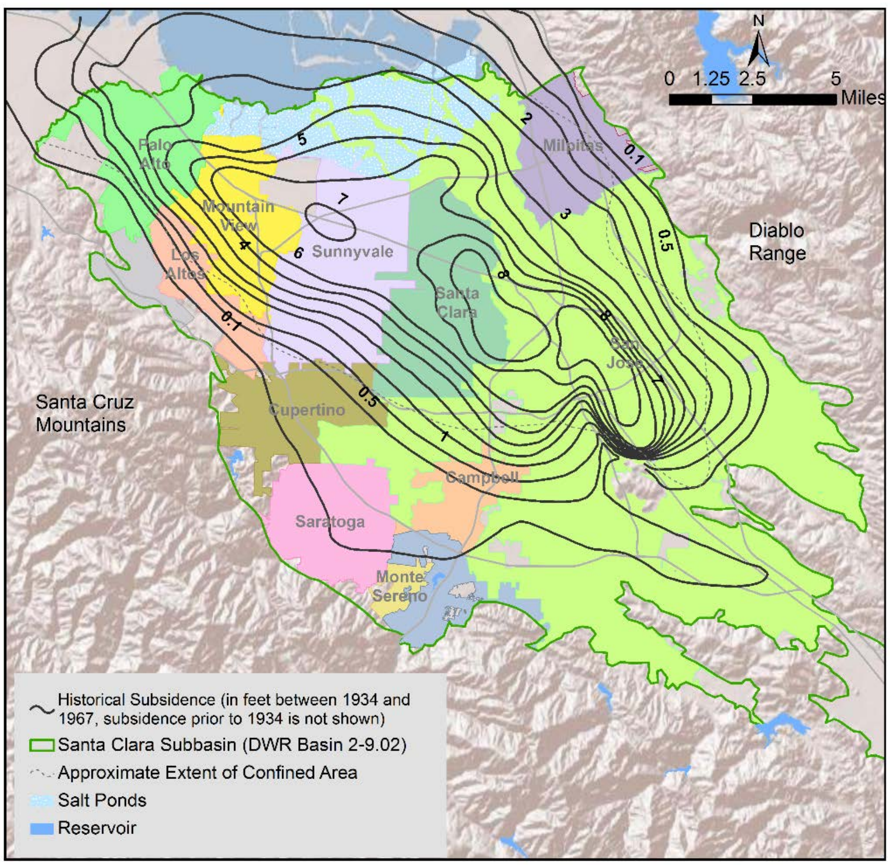


2.2.2 Land Subsidence

The northern Santa Clara Valley was the first area in the United States where permanent land subsidence due to groundwater withdrawal was recognized.[35] From about 1915 to 1966, groundwater pumping in the Santa Clara Plain increased dramatically due to growing agricultural use and population growth, resulting in a decline of groundwater levels by as much as 200 feet and long-term overdraft. Fluid pressure in the aquifers was reduced, resulting in the dewatering and compression of fine-grained materials (e.g., clays) and a broad sagging of the land surface. About 13 feet of inelastic (permanent) subsidence was observed in San Jose between 1915 and 1969. The land subsided by 3 to 6 feet over a large area encompassing north San Jose, Santa Clara, Sunnyvale, and Mountain View and subsidence of over a foot stretched over 100 square miles. Figure 2-12 shows contours of historical subsidence occurring between 1934 and 1967.

Serious problems developed as a result of subsidence, including flooding of lands adjacent to San Francisco Bay, decreased ability of local streams to carry away winter flood waters, and damage to utilities and infrastructure. It is estimated that subsidence resulted in at least \$30 to \$40 million in damage in 1982 dollars.[36] This necessitated the construction of additional dikes, levees, and flood control facilities to protect properties from flooding.

Figure 2-12. Historical Subsidence in the Santa Clara Plain (1934-1967)

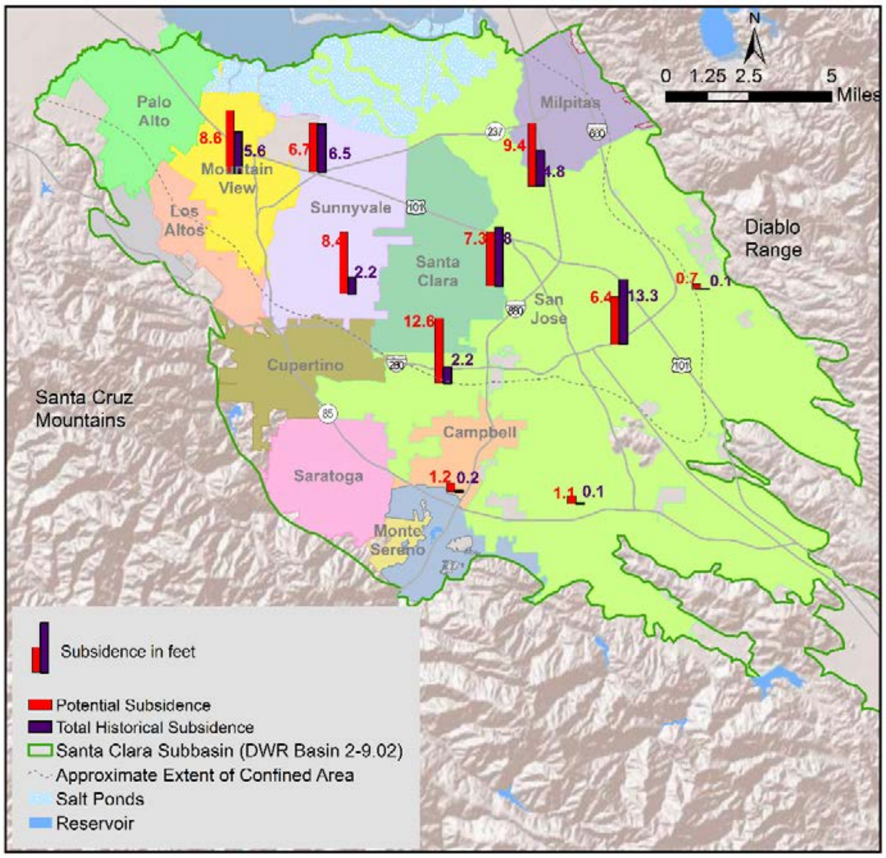


[35] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982,1988.

[36] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982,1988.

Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive management programs, which allowed artesian heads to recover substantially. Some amount of elastic subsidence occurs annually in response to seasonal pumping and recharge as substantiated by ground surface elevations measured with Interferometric Synthetic Aperture Radar (InSAR).[37] The District has established an acceptable subsidence rate of no more than 0.01 feet per year on average, which was endorsed by the Water Retailer Groundwater Subcommittee. The District has evaluated remaining land subsidence potential under prolonged overdraft conditions, as shown in Figure 2-13, and has established water level thresholds at ten subsidence index wells.[38] These thresholds are the groundwater levels that must be maintained to ensure a low risk of unacceptable land subsidence, as described in Chapter 6.

Figure 2-13. Historical and Potential Subsidence in the Santa Clara Plain



Even with the managed recharge of local and imported water, groundwater alone cannot support the Santa Clara Plain, which is a heavily urbanized area. Programs that reduce or offset groundwater pumping (e.g., treated water deliveries, water conservation, and water recycling) are critical to avoid long-term overdraft, additional subsidence, and salt water intrusion. The potential for renewed inelastic subsidence in the Santa Clara Plain is an ongoing concern, and the District carefully monitors and manages water supplies to minimize the risk of subsidence recurring. The Coyote Valley is predominantly composed of coarser-grained materials, and land subsidence has not been observed in the area.

[37] Schmidt and Burgmann, Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, 2003.

[38] Geoscience Support Services Inc., Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

2.2.3 Surface Water and Groundwater Interaction

The District's managed recharge program includes significant recharge through many miles of stream channels over the recharge area, indicating groundwater and surface water generally are disconnected in these reaches. As described further below, the managed recharge program helps to maintain flows in these creeks, most of which would flow only intermittently otherwise. The District is not aware of any areas where groundwater pumping has a significant or unreasonable effect on interconnected surface water.

The District has a comprehensive surface water monitoring network to measure creek flows, comply with water rights reporting and reservoir restrictions, and meet environmental requirements. Stream gauging by the District is discussed in Chapter 7. Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose.

Figure 2-14 shows areas of known and suspected surface water/groundwater interaction. Identification of these areas is based on observations by District field staff. Gaining reaches are primarily located in sections of the creeks overlying the confined area of the subbasin closer to San Francisco Bay. Exceptions to this are:

- San Francisquito Creek (northern Santa Clara Plain): Metzger studied San Francisquito Creek stream flow gains and losses between April 1996 and May 1997.[39] Stream flow losses were greatest in the reach from Sand Hill Road to Middlefield Road where the creek is underlain by coarse alluvium. Downstream of Middlefield Road, tidal effects and storm drain discharges made it difficult to quantify gains and losses. Groundwater hydrographs indicate the water table may intersect the stream bed in this reach, particularly in the winter and spring months. San Francisquito Creek was losing from Woodland Avenue to Newell Road. Downstream of Newell Road was gaining, but the source of the water could not be determined due to storm drain discharge and tidal influence. The average annual streamflow loss from San Francisquito Creek was estimated at 1,050 AF per year.
- Lower Silver Creek (eastern Santa Clara Plain): District field staff have identified a portion of Lower Silver Creek where groundwater discharges into surface water based on field observations.
- Saratoga Creek (western Santa Clara Plain): Tetrachloroethene (released into groundwater from a dry cleaning facility) has been detected in Saratoga Creek near downtown Saratoga near the subbasin's western margin. This indicates that groundwater is seeping into the creek at least intermittently.
- Fisher Creek (western Coyote Valley): Surface water in Coyote Creek recharges groundwater along the southern and east sides of the Coyote Valley. Groundwater in the area generally flows towards the northwest, where it rises and discharges into Fisher Creek due to the complex geologic and hydrogeologic conditions of the area.
- Laguna Seca Area (northwestern Coyote Valley): Laguna Seca is intermittent wetland caused by a combination of shallow groundwater and flooding. Iwamura[40] states that the Laguna Seca area, before the installation of an artificial drain, was part of the historical swampy or marshy area due to groundwater discharge to the surface and overflowed into Coyote Creek.

The portions of the Santa Clara Subbasin that are most likely to have surface water/groundwater interaction can be inferred through historical ecology and the depth to groundwater.[41] Figure 2-15 presents historical ecology mapping developed by the San Francisco Estuary Institute (SFEI), which maps areas such as wetlands, marshes, and willow

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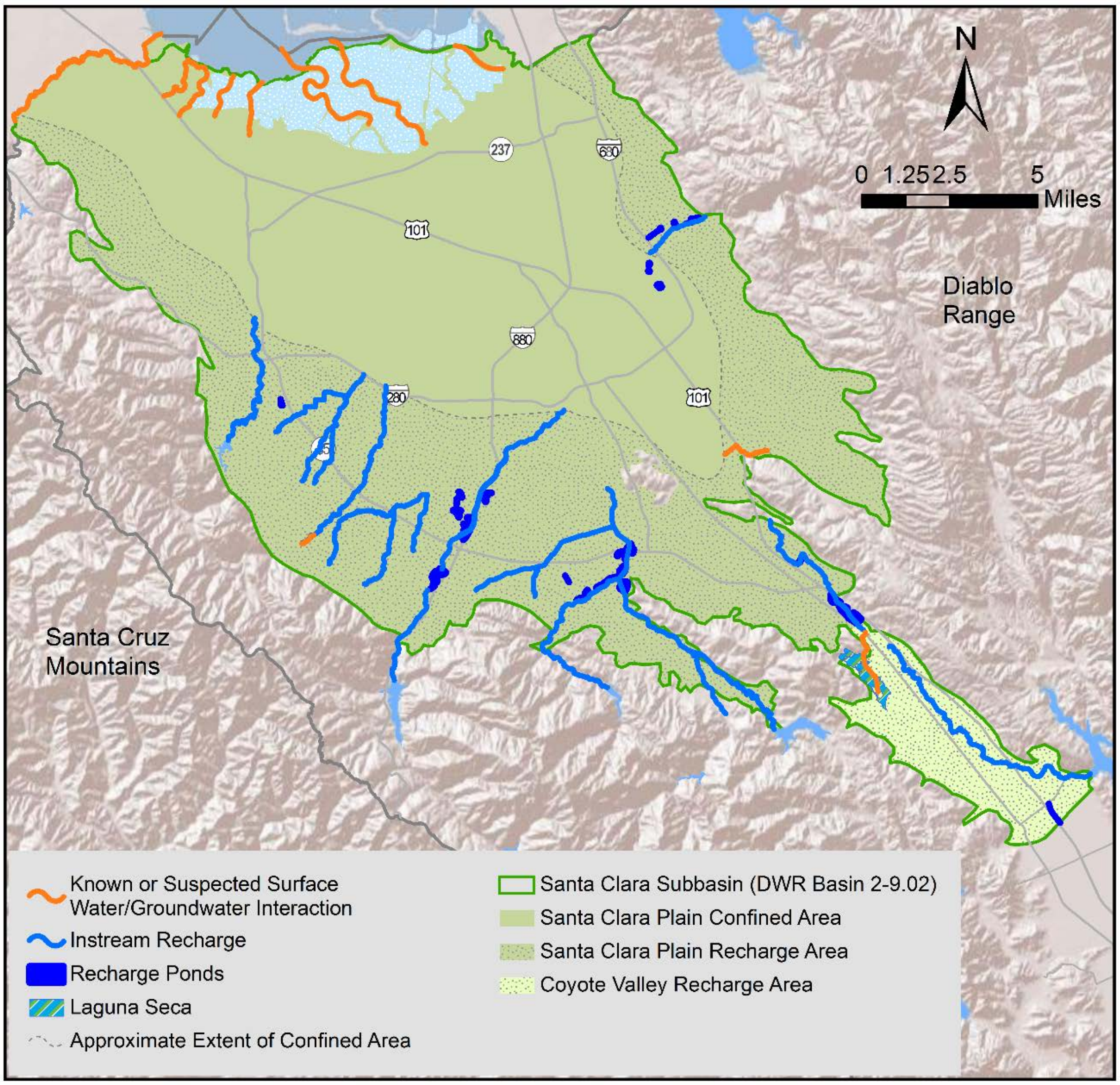
[39] Metzger, Streamflow Gains and Losses along San Francisquito Creek and Characterization of Surface-Water and Ground-Water Quality, Southern San Mateo and Northern Santa Clara Counties, California, 2002.

[40] Iwamura Hydrogeology of the Santa Clara and Coyote Valleys Groundwater Basins, California, 1995.

[41] SCVWD, GIS Coverage of Depth to First Groundwater, 2003.

groves that may be associated with shallow groundwater.[42,43] Some of the wetland areas may have been present due to poorly draining soils rather than surface water/groundwater interaction. It is also important to note that this was the historical distribution circa the early 1800s, prior to development and does not represent current or even recent conditions. This figure also indicates that, historically, the Guadalupe River was the only perennial stream in the Santa Clara Subbasin. The other creeks were intermittent, running during the wet season, but dry in the summers.

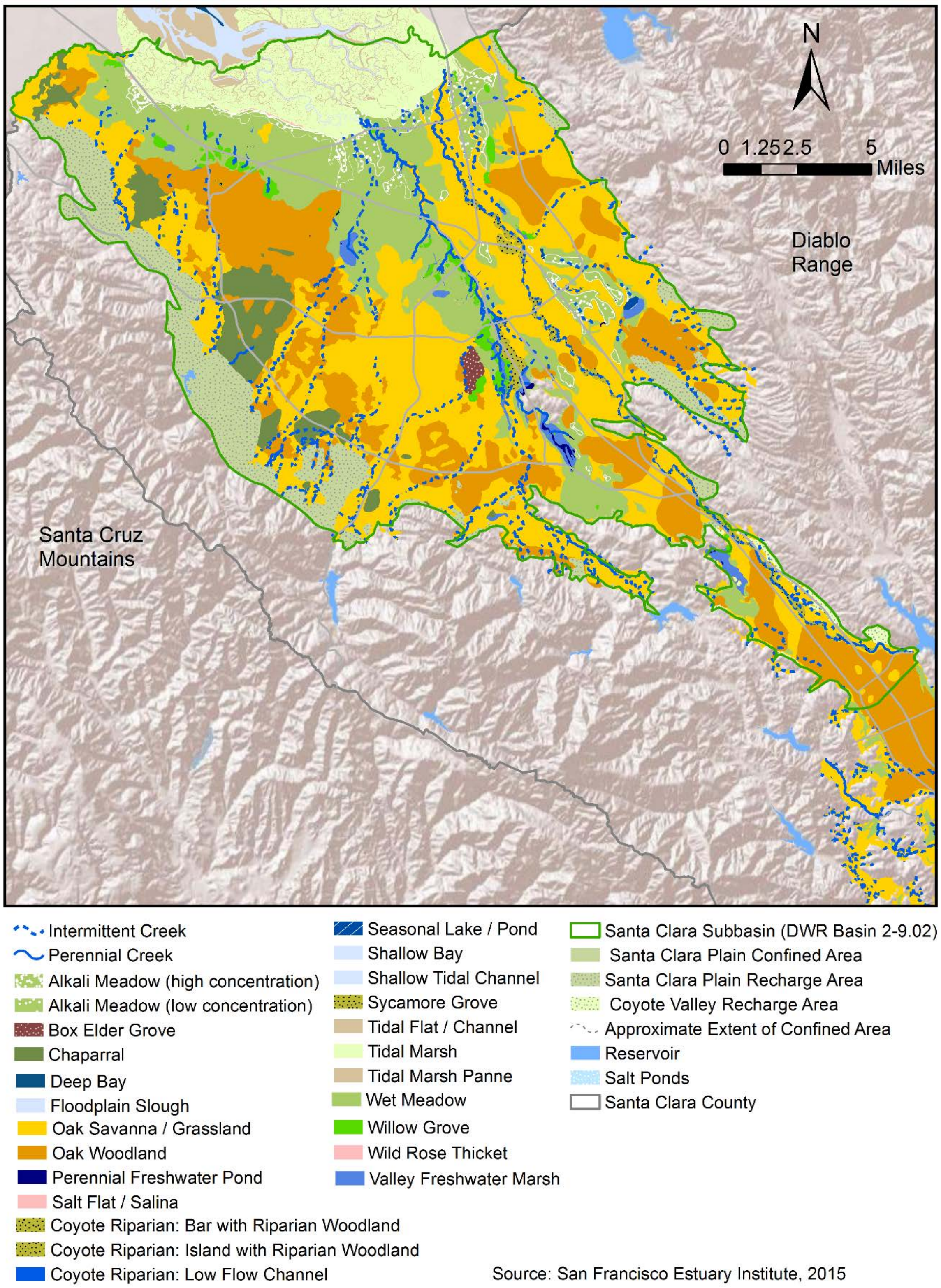
Figure 2-14. Santa Clara Subbasin Surface Water/Groundwater Interaction



[42] Beller, et al., Historical Vegetation and Drainage Patterns of Western Santa Clara Valley: A technical memorandum describing landscape ecology in Lower Peninsula, West Valley, and Guadalupe Watershed Management Areas, 2010.

[43] Grossinger, et al., Coyote Creek Watershed Historical Ecology Study: Historical Condition, Landscape Change, and Restoration Potential in the Eastern Santa Clara Valley, California, 2006.

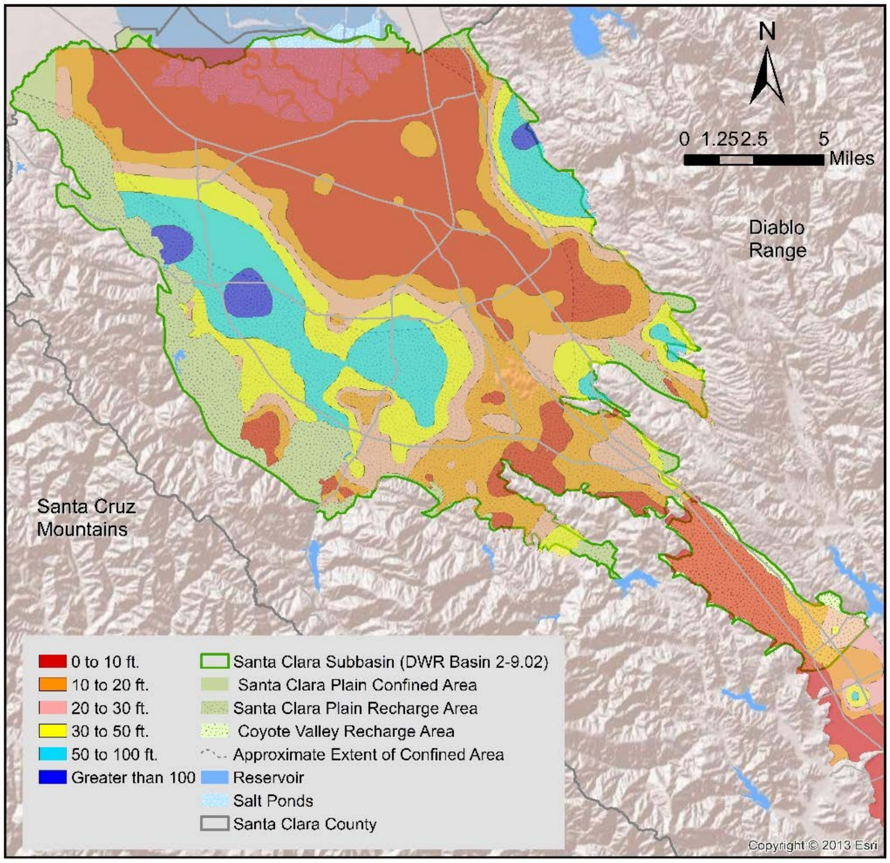
Figure 2-15. Santa Clara Subbasin Historical Ecology



Source: San Francisco Estuary Institute, 2015

Figure 2-16 is a generalized depth to first groundwater map, showing the shallowest groundwater conditions encountered at leaking underground storage tank sites. Areas exhibiting shallow groundwater would be more likely to display surface water/groundwater interaction.

Figure 2-16. Depth to First Groundwater in the Santa Clara Subbasin



Based on the most shallow water encountered at leaking underground storage tank sites as of 2003.

The District's managed recharge program relies on losing stream reaches, where water is moving out of the stream into the subsurface (Figure 2-14). Although these areas are net losing reaches, some reaches may intermittently gain during the wet season.[44]

The natural stream flow in these sections of creeks is enhanced through the District's release of local and imported water. Although many of these creeks were normally dry during the summer, the District's recharge program has resulted in extending the period of flow in the creeks. Data from the Coyote Creek Edenvale gauge, before and after the construction of Anderson Dam indicates that prior to the dam's construction, there was no flow was observed a majority of the time from May to November. After reservoir construction, flow was observed a majority of the time during the same months. Also, the number of months where daily flow was observed in Coyote Creek increased post-construction. This indicates that stream flows have increased due to District reservoir operations.

[44] Hanson, Hydrologic Framework of the Santa Clara Valley, 2015.

2.2.4 Groundwater Quality

The District has monitored and evaluated groundwater quality in the Santa Clara Subbasin for decades, with regular testing since the mid-1980s. Water quality data presented and summarized in this section represents data from the last ten-year period (2006-2015) collected by the District and other agencies. The primary source for data collected by other agencies is compliance sampling for public water supply wells submitted by water retailers to the State DDW. The District's groundwater monitoring and evaluation allows for an appraisal of current conditions and offers a consistent basis for detecting near-term and long-term trends. The Santa Clara Subbasin generally produces groundwater of good quality that does not need treatment beyond disinfection. Groundwater quality data for the Santa Clara Plain and Coyote Valley groundwater management areas are discussed separately, below.

2.2.4.1 Santa Clara Plain

Groundwater in the Santa Clara Plain is typically of very good quality, with detections of parameters above health-based MCL infrequent (Figure 2-17). Figures 2-18 and 2-19 show the relative concentrations of inorganic parameters with health-based MCLs and aesthetic-based SMCLs[45] for the period 2006 to 2015 in the principal aquifer. This appraisal is based on 10 years of compiled data consisting of District monitoring data and water quality data acquired from the Department of Drinking Water. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents in the Santa Clara Plain. Variation from this includes groundwater with sodium bicarbonate, sodium chloride, and mixed cation-mixed anion character. The CY 2015 median TDS concentration in the principal aquifer zone was 400 mg/L. TDS occurs at higher concentrations at depth in some localized areas including Evergreen (southeast San Jose) and Palo Alto.

Some areas in the shallow aquifers adjacent to salt ponds and tidal creeks near San Francisco Bay have been affected by salt water intrusion, as indicated by higher chloride and other indicators in some shallow monitoring wells. This condition is discussed more in section 2.2.5.

Summary statistics for the Santa Clara Plain shallow and principal aquifer zones are presented in Tables 2-1 and 2-2, respectively. These tables include only those parameters with a health-based MCL or aesthetic-based SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases the most recent data is used. Tables 2-3 and 2-4 present the organic chemicals detected between 2006 and 2015 in the shallow and principal aquifers, respectively. Although some organic chemicals are detected in the Santa Clara Plain, detections are infrequent and are typically low concentrations.[46]

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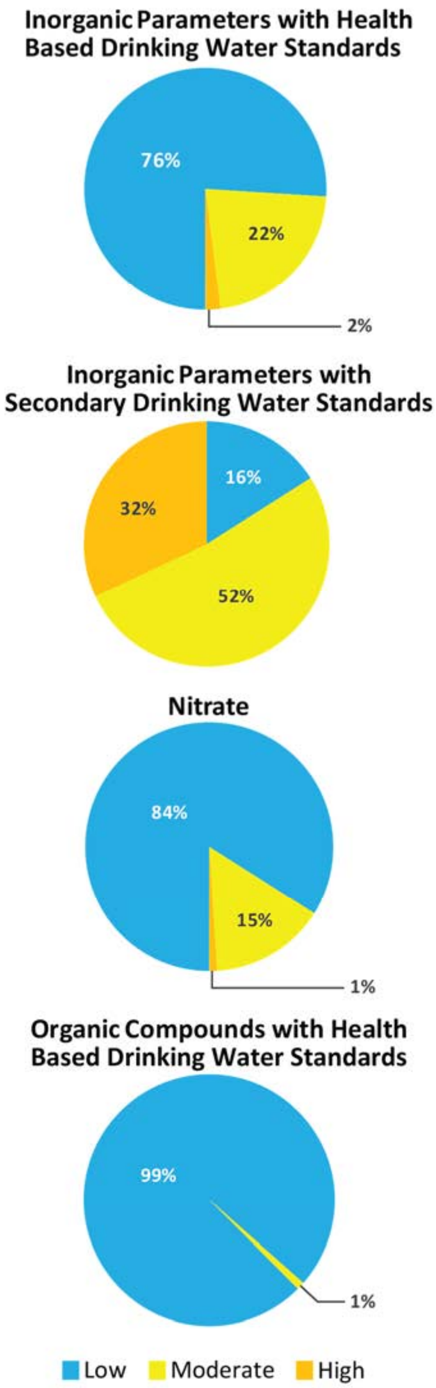
[45] Maximum Contaminant Levels are health-based drinking water standards established by the California Division of Drinking Water or U.S. Environmental Protection Agency. Secondary MCLs are aesthetic-based standards established by these agencies to address aesthetic issues such as taste and odor. Figures 2-18 and 2-19 show only those inorganic parameters detected in moderate or high concentrations relative to the MCL or SMCL.

[46] Lawrence Livermore National Laboratory, California Aquifer Susceptibility, A Contamination Vulnerability Assessment for the Santa Clara and San Mateo County Groundwater Basins, 2004.

Figure 2-17. Santa Clara Plain Principal Aquifer Frequency of Drinking Water Standard Exceedances (2006-2015)



High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients, and radioactive parameters. These constituents are typically naturally occurring in the Santa Clara Plain, leaching from rocks and sediments in contact with groundwater. Man-made sources include industrial and manufacturing facilities.

Water quality in principal aquifers is generally very good for inorganic parameters; over 75% of principal aquifers have low concentrations with respect to health-based Maximum Contaminant Levels (MCLs). Parameters detected in the high range include nitrate, arsenic, and aluminum. However, these detections represent a small fraction of the principal aquifer zone (2%). Parameters in the moderate range (above ½ the MCL) include aluminum, selenium, nitrate, total chromium, hexavalent chromium, and perchlorate. No radioactive parameters were detected above ½ the MCL.

While health-based drinking water standards have been established for many inorganic parameters, some constituents also have secondary MCLs based on their ability to affect the aesthetic properties of water through taste, color, odor, or by causing staining or scale formation. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a third of the principal aquifer, and in moderate concentrations in about half the aquifer. Iron, manganese, and aluminum were detected above the SMCL.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems can impact groundwater quality. Nitrate was detected above the MCL in a small portion of the Los Altos area and in the upper portion of the Almaden Valley. This is likely a legacy issue from agricultural land use, which was widespread historically throughout the Santa Clara Subbasin.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. While there are localized detections of some VOCs in the Santa Clara Plain, there are minimal impacts to deep drinking water aquifers (less than 1% of the area) despite hundreds of sites with known releases in the shallow aquifer zone.

Figure 2-18. Santa Clara Subbasin Principal Aquifer Concentrations Relative to Primary Drinking Water Standards (2006-2015)

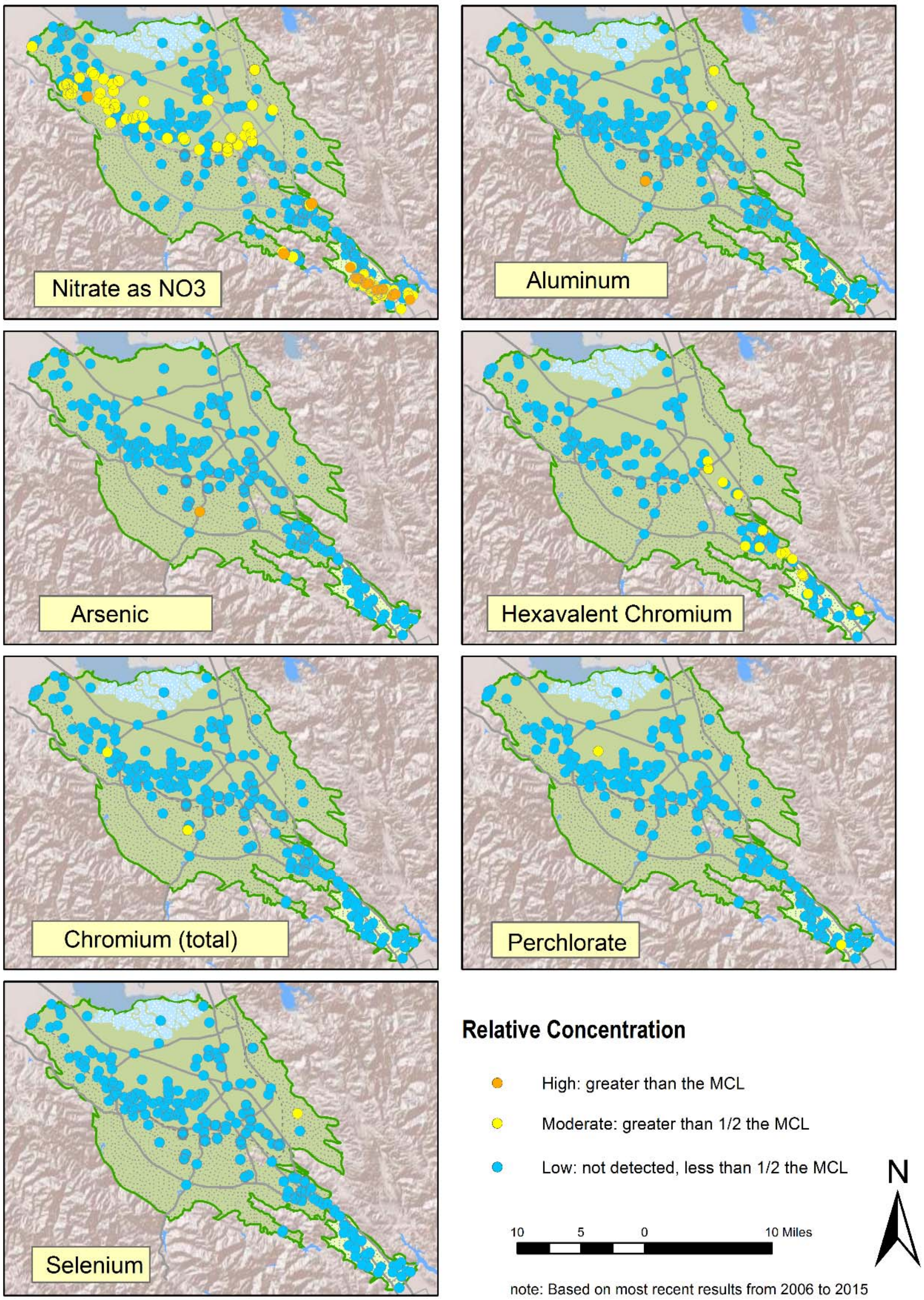


Figure 2-19. Santa Clara Subbasin Principal Aquifer Concentrations Relative to Secondary Drinking Water Standards (2006-2015)

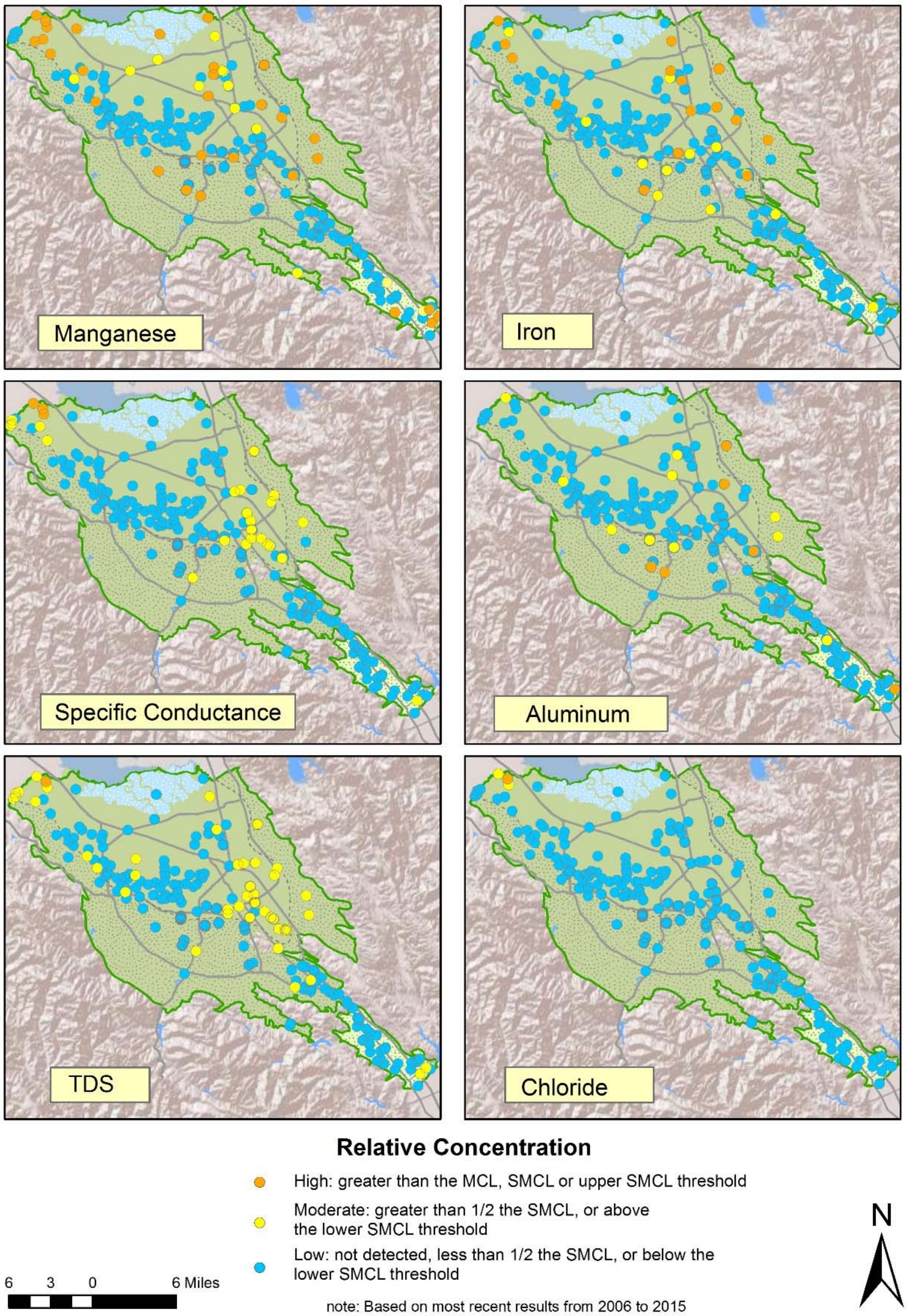


Table 2-1. Santa Clara Plain Shallow Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	39	27	139	39
Antimony (ug/L)	6	---	29	< 1	< 2	---
Arsenic (ug/L)	10	---	38	1.1	18	3.1
Asbestos (MFL)	7	---	1	<0.2	---	---
Barium (ug/L)	1,000	---	38	109	348	108
Beryllium (ug/L)	4	---	29	< 1	< 1	---
Boron (ug/L)	---	---	38	295	1,820	482
Cadmium (ug/L)	5	---	32	< 1	< 1	---
Chloride (mg/L)	---	250	30	62	133	42
Total Chromium (ug/L)	50	---	37	0.85	6.8	1.60
Chromium VI (ug/L)	10	---	15	0.88	2.9	0.91
Color (Color Units)	---	15	1	<3	---	---
Copper (ug/L)	---	1,000	36	1.7	5.1	1.6
Cyanide (ug/L)	150	---	1	<100	---	---
Fluoride (mg/L)	2	---	36	0.09	0.43	0.12
Foaming Agents (MBAS) (ug/L)	---	500	1	<0.05	---	---
Iron (ug/L)	---	300	35	7.6	1,795	71
Lead (ug/L)			37	< 2	< 5	---
Manganese (ug/L)	---	50	37	22	5,877	215
Mercury (ug/L)	2	---	37	< 1	< 1	---
Nickel (ug/L)	100	---	38	2.0	14	3.5
Nitrate as N (mg/L)	10	---	38	1.6	4.7	11
Nitrate + Nitrite (as N) (ug/L)	10,000	---	1	1,800	---	---
Nitrite (as N) (ug/L)	1,000	---	3	< 400	< 400	---
Odor - Threshold (Odor Units)	---	3	1	2	---	---
Perchlorate (ug/L)	6	---	32	< 4	< 4	---
Selenium (ug/L)	50	---	35	< 5	< 5	---
Silver (ug/L)	---	100	36	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	30	934	1,924	502
Sulfate (mg/L)	---	250	30	64	301	73
Thallium (mg/L)	2	---	33	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	30	549	1,122	274
Turbidity (NTU)	---	5	33	0.18	47	1.2
Zinc (ug/L)	---	5,000	39	< 10	< 50	---

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units

2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.

3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.

4. n = number of wells sampled for each parameter.

5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-2. Santa Clara Plain Principal Aquifer Zone Water Quality Summary (2006-2015)

Parameter [1]	MCL [2]	SMCL [3]	n[4]	Results[5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	266	8.4	137	24
Antimony (ug/L)	6	---	265	< 6	< 6	---
Arsenic (ug/L)	10	---	265	0.39	2.3	0.63
Asbestos (MFL)	7	---	77	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	266	125	258	74
Beryllium (ug/L)	4	---	263	< 1	< 1	---
Boron (ug/L)	---	---	67	170	658	199
Cadmium (ug/L)	5	---	266	< 1	< 1	--
Chloride (mg/L)	---	250	265	46	117	17
Total Chromium (ug/L)	50	---	267	1.0	8.8	2.1
Chromium VI (ug/L)	10	---	272	1.5	6.8	2.0
Color (Color Units)	---	15	210	< 5	< 5	---
Copper (ug/L)	---	1,000	265	1.9	11	3.0
Cyanide (ug/L)	150	---	216	< 100	< 100	---
Fluoride (mg/L)	2	---	267	0.11	0.24	0.07
Foaming Agents (MBAS) (ug/L)	---	500	215	< .05	< .1	---
Iron (ug/L)	---	300	265	12	540	54
Lead (ug/L)	---	---	252	0.21	2.3	0.48
Manganese (ug/L)	---	50	264	1.4	209	11
Mercury (ug/L)	2	---	266	< 1	< 1	---
Nickel (ug/L)	100	---	266	0.55	4.2	1.0
Nitrate as N (mg/L)	10	---	278	2.9	6.4	13
Nitrate + Nitrite (as N) (ug/L)	10,000	---	189	3,000	6,900	2,700
Nitrite (as N) (ug/L)	1,000	---	217	< 400	< 400	---
Odor - Threshold (Odor Units)	---	3	211	0.73	1.4	0.99
Perchlorate (ug/L)	6	---	262	<4	<4	--
Selenium (ug/L)	50	---	266	1.2	4.9	1.5
Silver (ug/L)	---	100	259	< 10	< 10	--
Specific Conductance (uS/cm)	---	600	265	680	1,085	235
Sulfate (mg/L)	---	250	265	47	80	27
Thallium (mg/L)	2	---	265	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	265	410	648	155
Turbidity (NTU)	---	5	257	0.26	2.7	0.58
Zinc (ug/L)	---	5,000	265	4.5	28	7.4

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-3. Santa Clara Plain Shallow Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
1,1,1 -Trichloroethane	---	32	6	2.1
1,1,2- Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	32	3	4.6
Bromomethane	---	32	3	0.63
Chloromethane	---	32	3	0.60
Di(2-ethylhexyl)phthalate	4	6	17	0.50
Diethyl phthalate	---	5	20	97
N-nitrosodi-n-butylamine (NDBA)	---	18	33	5.7

The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
"---" indicates no MCL is established.

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Table 2-4. Santa Clara Plain Principal Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
1,1,1-Trichloroethane	200	260	10	5.8
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	260	1	18
1,1,2-Trichloroethane	5	260	< 1	2.7
1,1-Dichloroethene	6	260	3	6.3
1,2,3-Trichlorobenzene	---	247	< 1	0.58
1,2,3-Trichloropropane	---	184	< 1	1.0
Acetone	---	11	9	5.0
Bromodichloromethane (THM)	---	250	3	2.6
Bromoform (THM)	---	250	4	11
Chloroform (THM)	---	250	5	35
Chloromethane	---	142	< 1	0.51
Di(2-ethylhexyl) phthalate	4	209	< 1	3.2
Dibromoacetic Acid (DBAA)	---	37	2.7	1.0
Dibromochloromethane (THM)	---	250	3	6.5
Dibromochloropropane (DBCP)	0.02	216	< 1	0.01
Dichloroacetic Acid (DCAA)	---	37	3	13
Dichlorodifluoromethane (Freon 12)	---	248	< 1	13
Dichloromethane (Methyl Chloride)	5	260	< 1	1.1
Diisopropyl Ether	---	141	< 1	3.0
HAA5 - Haloacetic Acids	60	29	7	26
Naphthalene	---	248	< 1	1.0
N-Nitrosodi-N-Butylamine(NDBA)	---	16	25	4.1
P-Isopropyltoluene	---	241	2	0.5
Tetrachloroethene	5	260	< 1	0.8
Toluene	150	260	< 1	0.55
Total Trihalomethanes	80	160	16	37
Trichloroacetic Acid (TCAA)	---	37	3	13
Trichloroethene	5	260	< 1	1.2
Trichlorofluoromethane (Freon 11)	150	260	< 1	5.0
Xylenes (Total)	1,750	254	< 1	0.5

The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
"---" indicates no MCL is established.

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2.2.4.2 Coyote Valley

Groundwater in the Coyote Valley is typically of good quality. The primary exception is nitrate, which is detected above the MCL in some wells due to historic and ongoing sources. Unlike the Santa Clara Plain, the Coyote Valley is largely rural and agricultural, with ongoing nitrate sources including synthetic fertilizers and septic systems. (Figure 2-20) provides an overview of water quality in the Coyote Valley. Figures 2-18 and 2-19 show the relative concentrations of inorganic parameters with health-based MCLs and aesthetic-based SMCLs for the period 2006 to 2015. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents. The CY 2015 median TDS concentration was 380 mg/L.

Summary statistics for the Coyote Valley are presented in Table 2-5 for parameters with a health-based MCL or aesthetic-based, SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases, the most recent data is used. Tables 2-6 shows organic chemicals detected between 2006 and 2015. Although some organic chemicals are detected in the Coyote Valley, detections are infrequent and are typically low concentrations.

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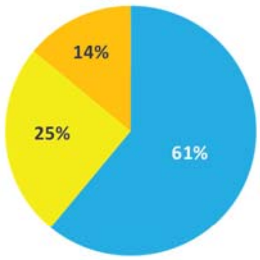
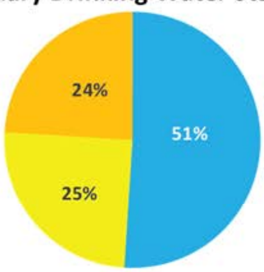
Figure 2-20. Coyote Valley Principal Aquifer Frequency of Drinking Water Standard Exceedances (2006-2015)

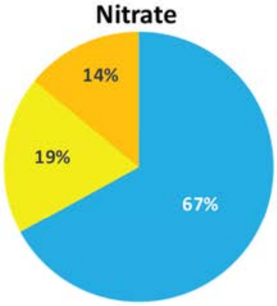
Inorganic Parameters with Health Based Drinking Water Standards



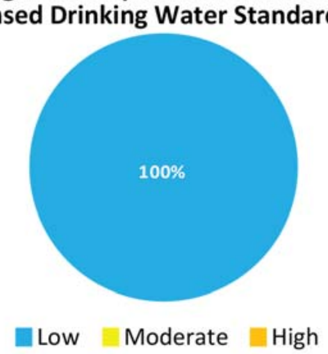
Inorganic Parameters with Secondary Drinking Water Standards



Nitrate



Organic Compounds with Health Based Drinking Water Standards



Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients and radioactive parameters. Trace and minor elements and radioactive parameters are typically naturally occurring, leaching from rocks and sediment in contact with groundwater. Anthropogenic sources of these constituents include industrial and manufacturing facilities.

Water quality in principal aquifers is generally very good for inorganic parameters; over 60% of principal aquifers have low concentrations with respect to health-based Maximum Contaminant Levels (MCLs). Other than nitrate, no inorganic compounds were detected above their health-based drinking water standard. Hexavalent chromium and perchlorate exceeded ½ of their MCL in localized areas within the Coyote Valley. No radioactive parameters were detected above ½ the established MCLs.

Some parameters affect the aesthetic properties of water, such as taste, color, and odor, or may cause staining or scale formation but do not represent a health concern. These parameters are given a Secondary MCL. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a quarter of the principal aquifer, and in moderate concentrations in about a quarter the aquifer. Manganese and aluminum were detected above the SMCL. TDS, specific conductance, iron, aluminum, and manganese were found at moderate concentrations in localized areas.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems can impact groundwater quality. Nitrate was found above its MCL over 14% of the Coyote Valley. The source of nitrate is historical and ongoing agricultural practices and use of septic systems.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. There were localized detections of some VOCs in the Coyote Valley, but none exceeding ½ their MCL.

High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Table 2-5. Coyote Valley Groundwater Quality Summary (2006-2015)

Parameter [1]	MCL [2]	SMCL [3]	n[4]	Results [5]		
				50th Percentile (median)	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	35	11	103	23
Antimony (ug/L)	6	---	34	< 2	< 6	---
Arsenic (ug/L)	10	---	34	< 2	< 2	---
Asbestos (MFL)	7	---	6	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	34	106	220	64
Beryllium (ug/L)	4	---	33	< 1	< 1	---
Boron (ug/L)	---	---	16	110	280	87
Cadmium (ug/L)	5	---	35	< 1	< 1	---
Chloride (mg/L)	---	250	33	40	94	18
Total Chromium (ug/L)	50	---	35	2	13.4	3.2
Chromium VI (ug/L)	10	---	25	1.9	6.9	2.1
Color (Color Units)	---	15	14	1.2	6.7	2.0
Copper (ug/L)	---	1,000	31	1.5	5.2	1.6
Cyanide (ug/L)	150	---	18	< 100	< 100	---
Fluoride (mg/L)	2	---	35	0.12	0.21	0.07
Foaming Agents (MBAS) (ug/L)	---	500	13	< .05	< .1	---
Iron (ug/L)	---	300	31	17	363	55
Lead (ug/L)	---	---	33	< 5	< 5	---
Manganese (ug/L)	---	50	31	2	204	13
Mercury (ug/L)	2	---	35	< 1	< 1	---
Nickel (ug/L)	100	---	35	1.4	2.8	---
Nitrate (as N) (mg/L)	10	---	37	4.2	10.9	5.6
Nitrate + Nitrite (as N) (ug/L)	10,000	---	15	4,700	12,000	5,900
Nitrite (as N) (ug/L)	1,000	---	19	230	430	120
Odor - Threshold (Odor Units)	---	3	15	0.7	2.4	0.70
Perchlorate (ug/L)	6	---	35	< 4	< 4	---
Selenium (ug/L)	50	---	35	< 5	< 5	---
Silver (ug/L)	---	100	31	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	32	580	977	143
Sulfate (mg/L)	---	250	31	38	63	22
Thallium (mg/L)	2	---	34	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	33	360	548	104
Turbidity (NTU)	---	5	27	0.3	2.2	0.54
Zinc (ug/L)	---	5,000	31	29	110	67

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units

2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.

3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.

4. n = number of wells sampled for each parameter.

5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 2-6. Summary of Organic Parameters Detected in the Coyote Valley (2006 to 2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Chloroform (THM)	---	30	3.3%	5.3
Toluene	150	30	3.3%	0.56
Dichloromethane (Methylene Chloride)	5	30	3.3%	1.0
Tert-Butyl Alcohol	---	22	4.5%	4.1
N-nitrosodi-n-butylamine (NDBA)	---	8	12.5%	2.3
Xylenes (Total)	1,750	20	5.0%	0.82
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	30	3.3%	2.2
Total Trihalomethanes (THMs)	80	13	7.7%	6.0

" ---" indicates no MCL is established.

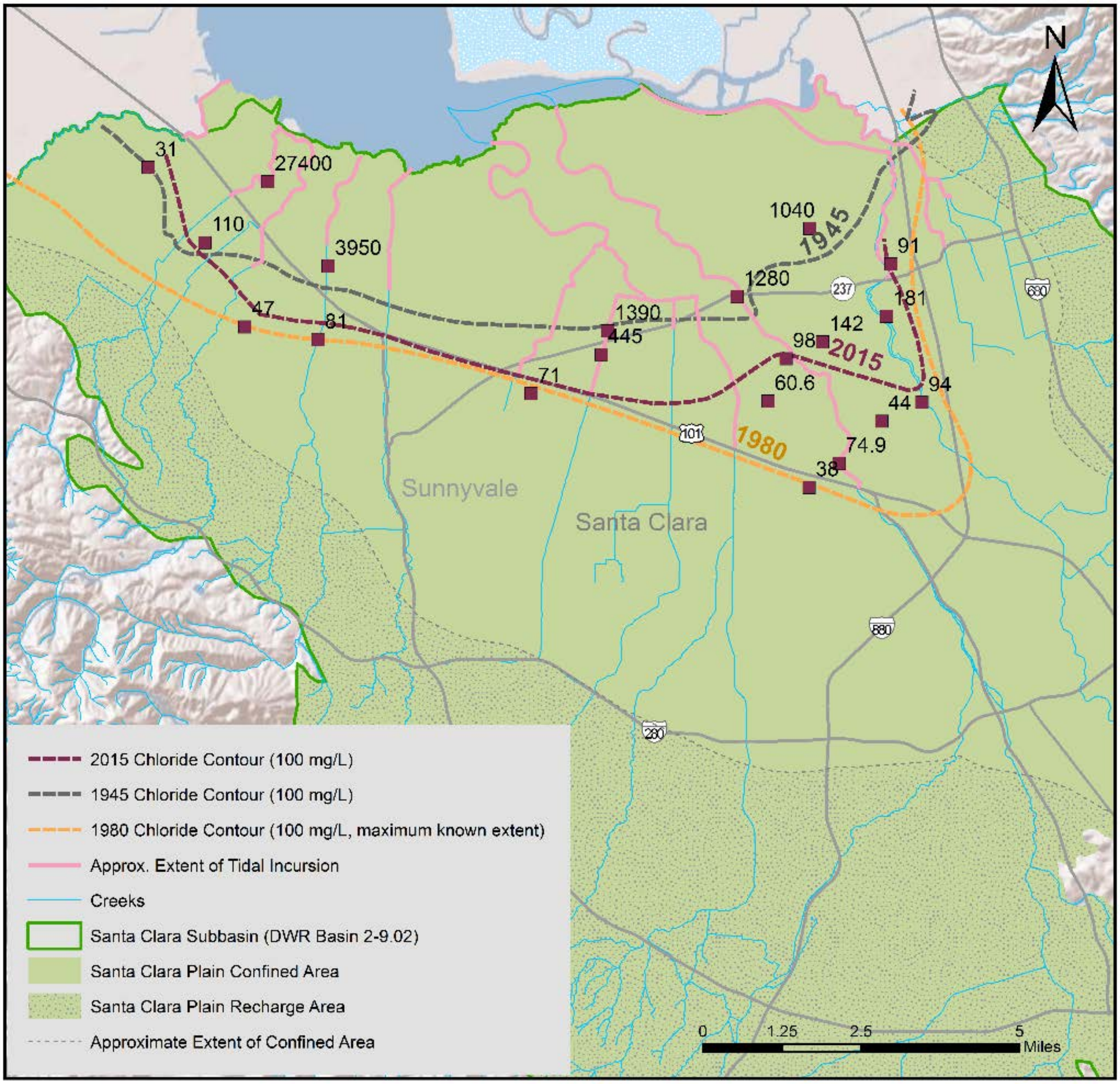
2.2.5 Salt Water Intrusion

Due to high groundwater pumping and land subsidence, particularly in the years following World War II, salt water intrusion has been observed in the shallow aquifer of the Santa Clara Plain (Figure 2-21). Saline intrusion in the shallow aquifer is attributed to incursion of sea water into the tidal reaches of creeks and subsequent transport to shallow groundwater through streambed percolation, improperly abandoned wells, cathodic protection wells, and other vertical conduits. Salt water intrusion was exacerbated by land subsidence, which decreased the elevation of the land surface adjacent to San Francisco Bay, causing further inland movement along tidal creeks. The degree of salt water intrusion in the shallow aquifer zone is gauged by the chloride content in monitoring wells located in the baylands area adjacent to southern San Francisco Bay. The District uses a chloride concentration of 100 mg/L to indicate the first sign of influence from salt water. This is a conservative threshold, since the aesthetic-based MCL for chloride is 250 mg/L.

Wells in which chloride is over 100 mg/L are located in a narrow band adjacent to the former salt evaporation ponds, except in the areas adjacent to Guadalupe River and Coyote Creek. In these areas, a larger portion of the shallow aquifer is affected due to tidal incursion in these channels that occurs due to historic land subsidence. A significant increase in chloride content is observed near the levee system that defines the former salt evaporation ponds with some samples having chloride content of several thousand parts per million.

Historically, salt water intruded only a small portion of the principal aquifer zone, and the chloride concentrations noted were relatively low. The mechanism of intrusion into the lower aquifer zone is believed to be due to inter-aquifer transfer through improperly destroyed wells or other deep borings. Presently, the monitoring network in the Baylands area has limited coverage of the principal aquifer zone.

Figure 2-21. Extent of Salt Water Intrusion in the Santa Clara Plain Shallow Aquifer Zone



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Chapter 3 – Llagas Subbasin Description

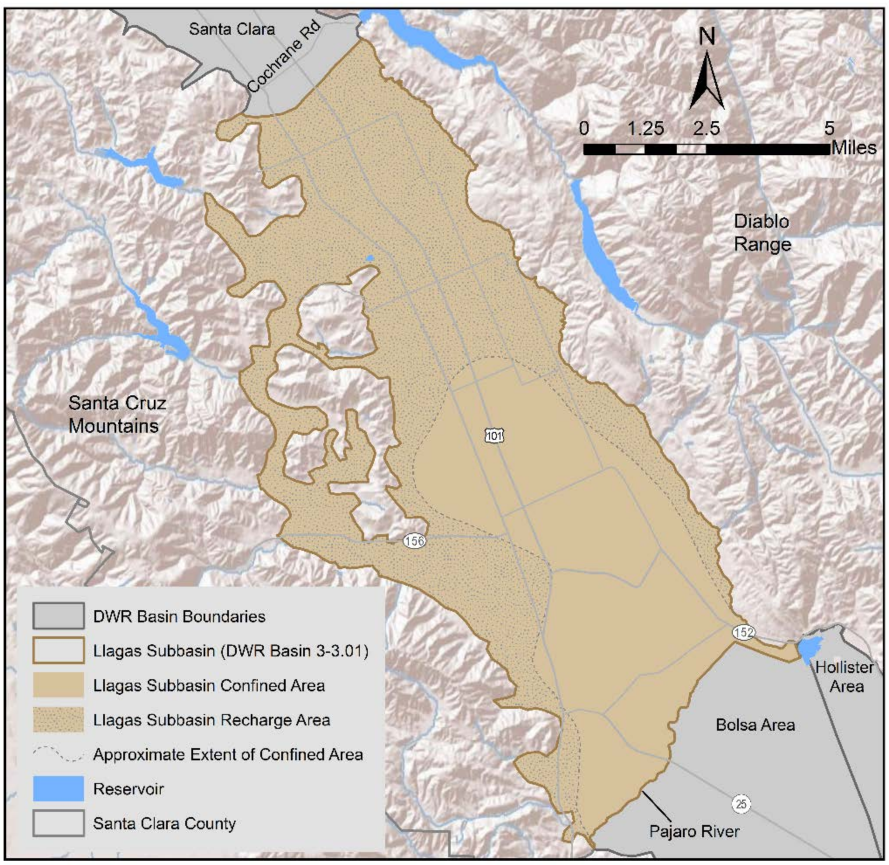
CHAPTER 3 – LLAGAS SUBBASIN DESCRIPTION

This chapter describes the Llagas Subbasin, including the physical setting and characteristics, and conditions related to groundwater elevation, water quality, land subsidence, groundwater/surface water interaction, and salt water intrusion.

3.1 BASIN SETTING

The Llagas Subbasin (DWR Basin Number 3-3.01) is located within the California Coast Ranges physiographic province between the San Andreas and Calaveras Fault zones. The subbasin is part of the larger Gilroy-Hollister Valley Groundwater Basin (Basin 3-3), which extends into San Benito County to the south. Similar to the Santa Clara Subbasin, the Llagas Subbasin underlies a relatively flat valley and consists of unconsolidated alluvial sediments.

Figure 3-1. Llagas Subbasin



3.1.1 Lateral Subbasin Boundaries

The Llagas Subbasin covers a surface area of about 88 square miles and forms a northwest-trending, elongated valley bounded by the Santa Cruz Mountains to the west and the Diablo Range to the east. The Llagas Subbasin is about 15 miles long in the northwest/southeast direction and 3 to 6 miles wide. The basis for the lateral boundary delineation is the geologic, hydrologic and topographic features in the subbasin.

The Llagas Subbasin is the northern extension of the Gilroy-Hollister Valley Groundwater Basin, which was created by offset along the major faults. The western and eastern subbasin boundaries are the geologic contact between

permeable to semi-permeable alluvial sediments within the valley and the impermeable bedrock of the adjacent mountain ranges. The Santa Cruz Mountains and Diablo Range on either side of the subbasin are primarily composed of sedimentary, metamorphic, and volcanic rocks of Jurassic, Cretaceous and Tertiary age.[47] The northern boundary with the Santa Clara Subbasin is the Coyote Creek alluvial fan in the Morgan Hill area, which forms a topographic and hydrologic divide between the groundwater and surface water flowing to the San Francisco Bay and water flowing to the Monterey Bay. The groundwater divide is approximately located at Cochrane Road area in Morgan Hill. Based on observed water level data, the boundary moves as much as a mile to the north or south depending on local groundwater conditions. The subbasin's southern boundary is institutional, coincident with the boundary between Santa Clara and San Benito counties and adjacent to the Bolsa Subbasin.

3.1.2 Recharge Areas

Like the Santa Clara Subbasin, the Llagas Subbasin has two hydrogeologic areas, the recharge area where groundwater is generally unconfined, and the confined area. The recharge area is located at the north, western, and eastern edges of the subbasin and is the area where active groundwater recharge takes place due to high lateral and vertical permeability. Fine-grained materials are not laterally continuous in the recharge area, though localized confined conditions can occur.

In the southern and central portion of the subbasin, clays and silts become more vertically and laterally extensive creating confined artesian conditions, especially in the southern portion near the Pajaro River. Within the confined area, low permeability units restrict the vertical flow of groundwater and divide the subbasin into shallow and principal aquifer zones. The boundary between the recharge and confined areas was originally defined based on flowing artesian wells.[48] The boundary is gradual and broad, and not as precise as its depiction on maps and figures implies.

3.1.3 Principal Aquifers and Aquitards

The Llagas Subbasin is a structural depression filled with Quaternary alluvium deposits of unconsolidated gravel, sand, silt and clay that eroded from adjacent mountain ranges by flowing water and were deposited into the valley (Figure 3-2). As in the Santa Clara Subbasin, the alluvium comprises interfingering alluvial fans, stream deposits and terrace deposits.

The Llagas Subbasin is comprised of unconsolidated alluvial sediments, with intercalated and discontinuous layers of gravel and sand (aquifer materials) and clay and silt (confining units) at various depths beneath the ground surface. The subbasin ranges in thickness from about 500 feet at the northern boundary to over 1,000 feet thick beneath the Pajaro River. The major aquitard forming the regional confining layer is commonly encountered between 20 and 100 feet below ground surface, and ranges in thickness from 40 to 100 feet.[49] Shallow aquifer zones generally refer to aquifers that occur within 150 feet of ground surface, while principal aquifer zones generally occur at depths below 150 feet. Cross-sections of the Llagas Subbasin are presented in Figures 3-3 through 3-6.

[47] Graymer, et al., Geologic Map of the San Francisco Bay Region, 2006.
[48] Clark, Ground Water in Santa Clara Valley, California, 1924.
[49] Santa Clara Valley Water District, Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, 1989.

Figure 3-2. Quaternary Alluvium Geologic Map of the Llagas Subbasin

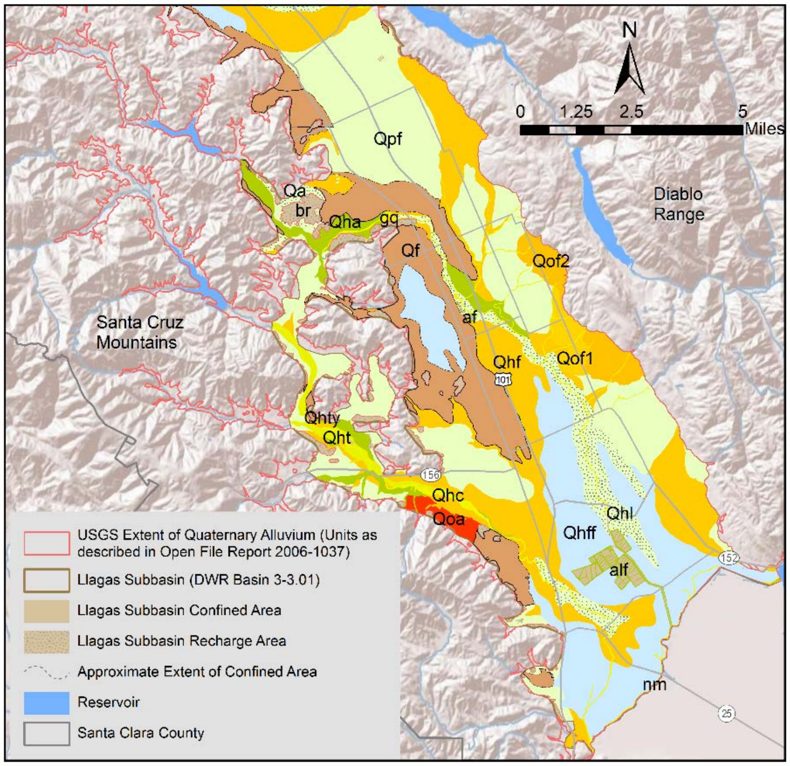


Figure 3-3. Llagas Subbasin Cross-Section Locations

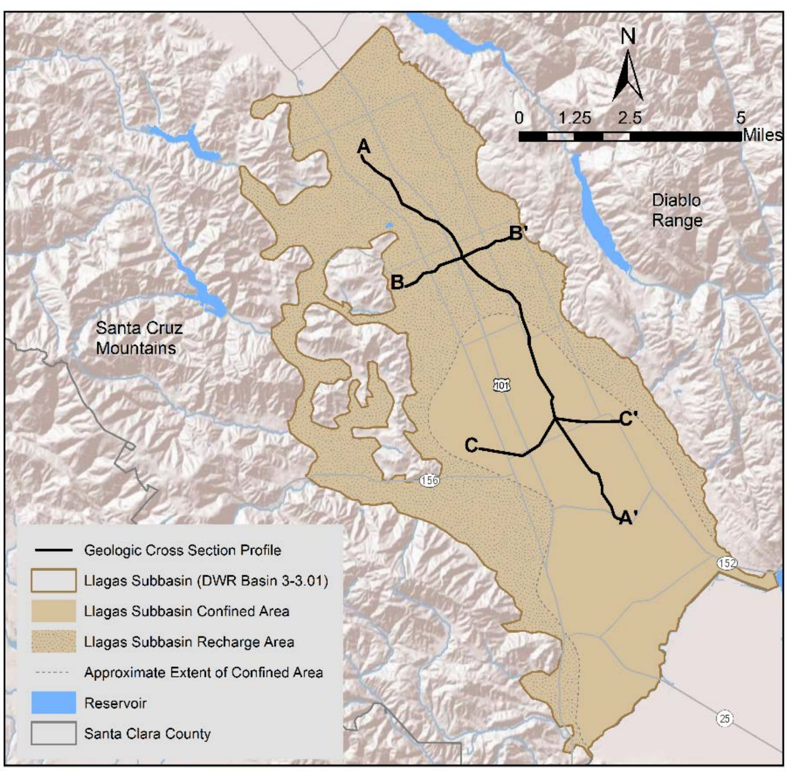


Figure 3-4. Llagas Subbasin Longitudinal Cross-Section

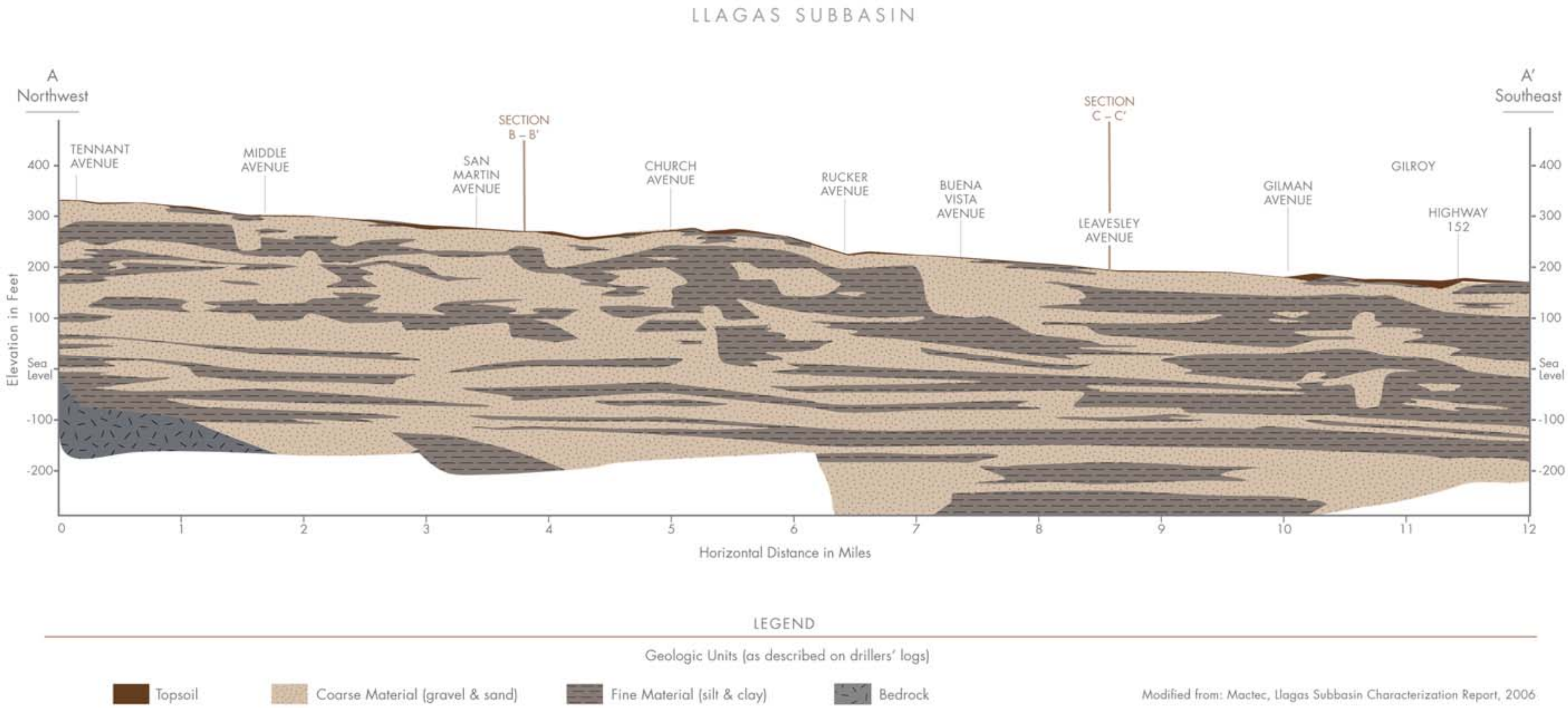


Figure 3-5. Llagas Subbasin Northern Transverse Cross-Section

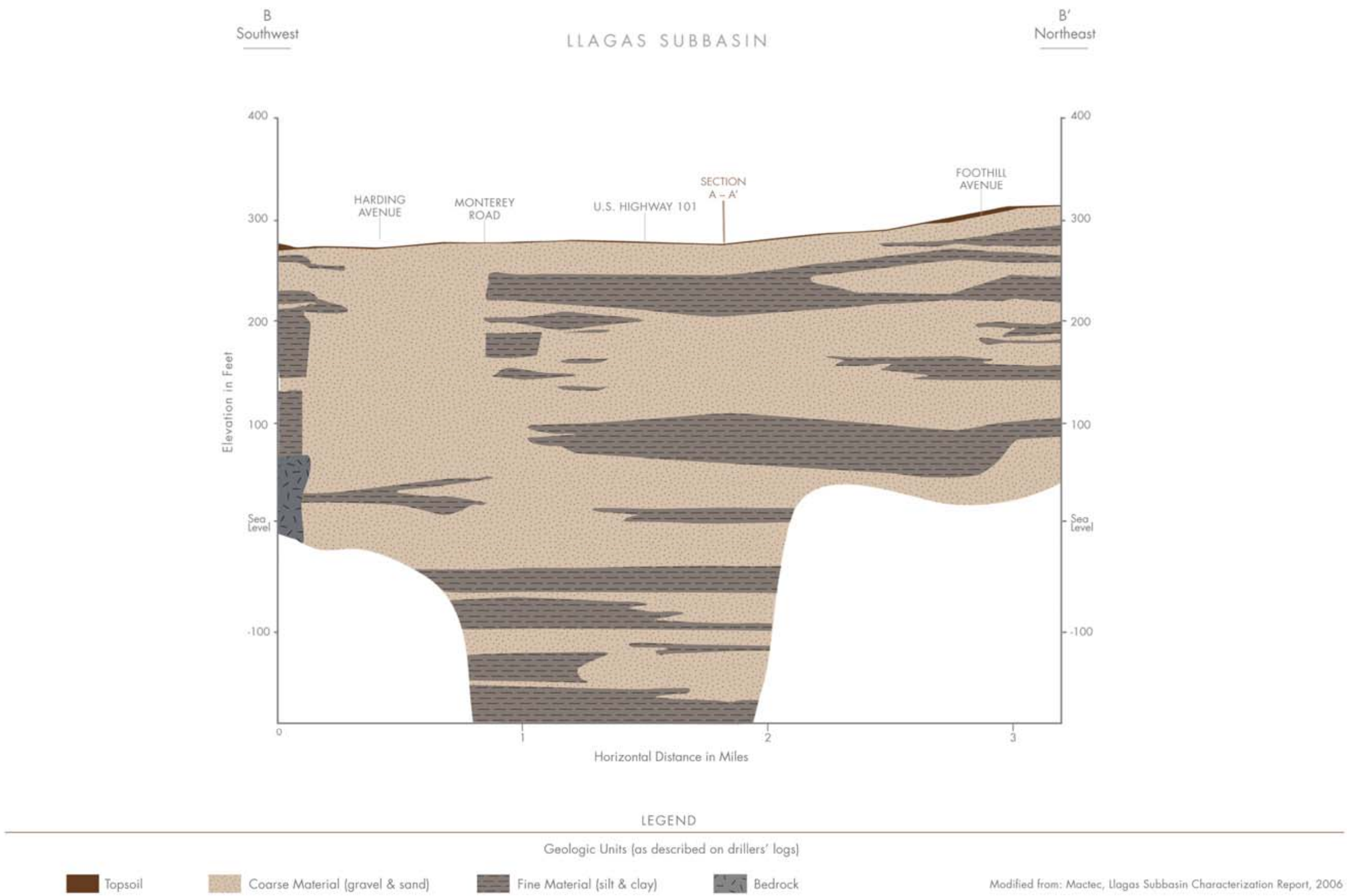
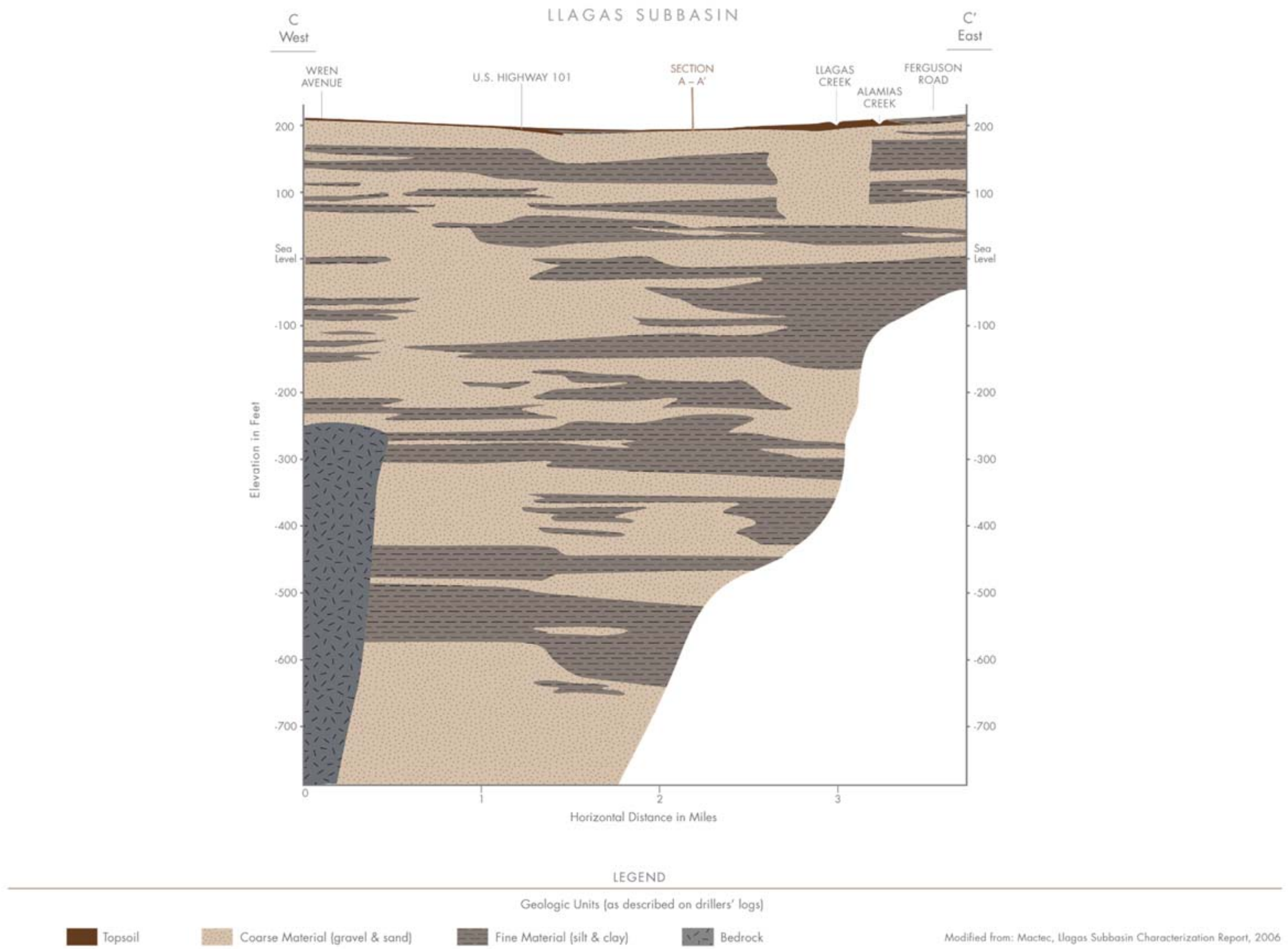


Figure 3-6. Llagas Subbasin Southern Transverse Cross-Section



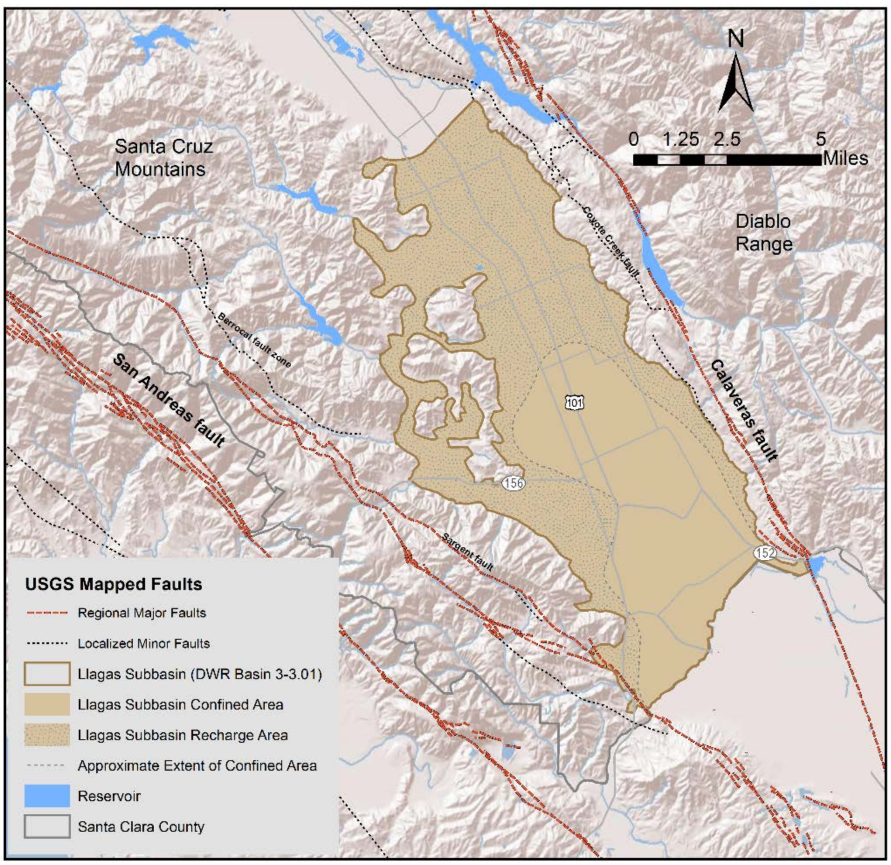
3.1.4 Subbasin Bottom

The bottom of the Llagas Subbasin is the geologic contact between unconsolidated alluvium and bedrock, an irregular surface occurring at varying depths. The alluvium thickness ranges from a few feet at the western and eastern edges of the subbasin to about 500 feet at the apex of the Coyote Creek alluvial fan in Morgan Hill and deepens to over 1,000 feet beneath the Pajaro River. Based on available drillers logs, most water supply and groundwater monitoring wells do not encounter bedrock, including a well recently drilled to a depth 1,015 feet at the southern center of the subbasin. Borehole data suggest that the depth to bedrock is highly variable throughout the subbasin.

3.1.5 Major Faults

Major northwest trending faults flank the structural trough that is the Llagas Subbasin, including the San Andreas Fault system in the Santa Cruz Mountains and the Calaveras and Coyote Creek Faults east of the subbasin in the Diablo Range (Figure 3-7).

Figure 3-7. Major Faults



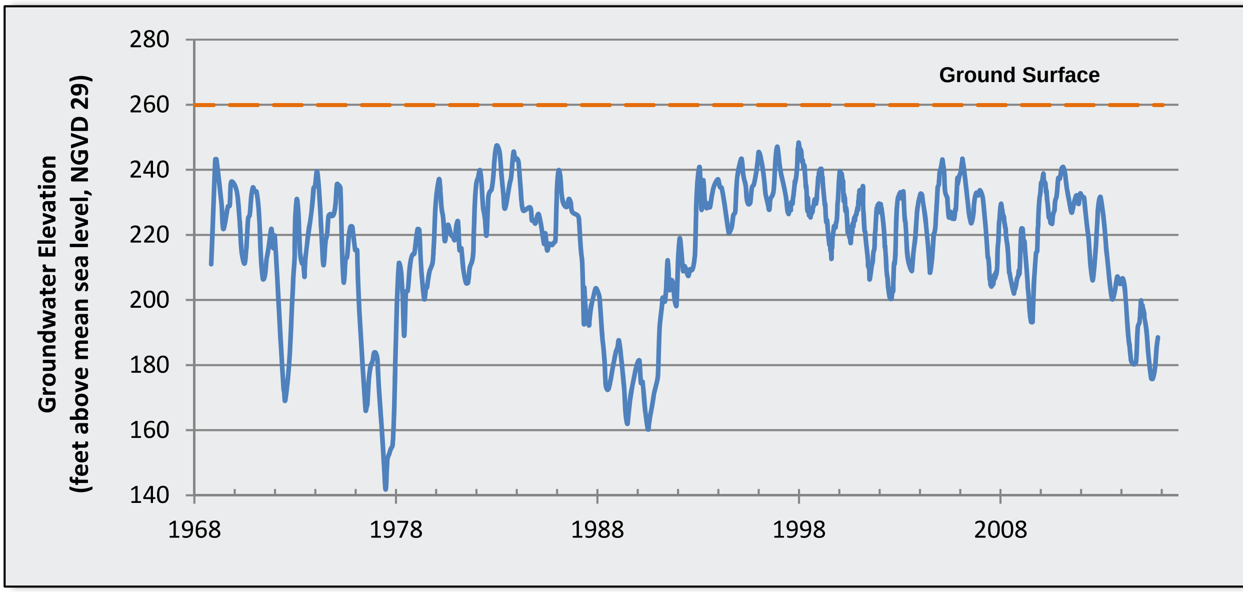
3.2 SUBBASIN CONDITIONS

This section describes Llagas Subbasin conditions with regard to groundwater elevation, flow, quality, land subsidence, surface water/groundwater interaction, and salt water intrusion.

3.2.1 Groundwater Elevation and Flow

Groundwater movement in the Llagas Subbasin generally follows surface water patterns, draining south toward the Pajaro River at the boundary with San Benito County. Locally, groundwater also moves toward areas of intense pumping. Vertical gradients in the subbasin are predominately downward, although several monitoring wells at the southern end of the subbasin are flowing artesian. Historic marshes located east of Gilroy and south of Pacheco Highway indicate an area of upward flow and groundwater discharge. Figure 3-8 is a long-term hydrograph for a regional index wells in the Llagas Subbasin.

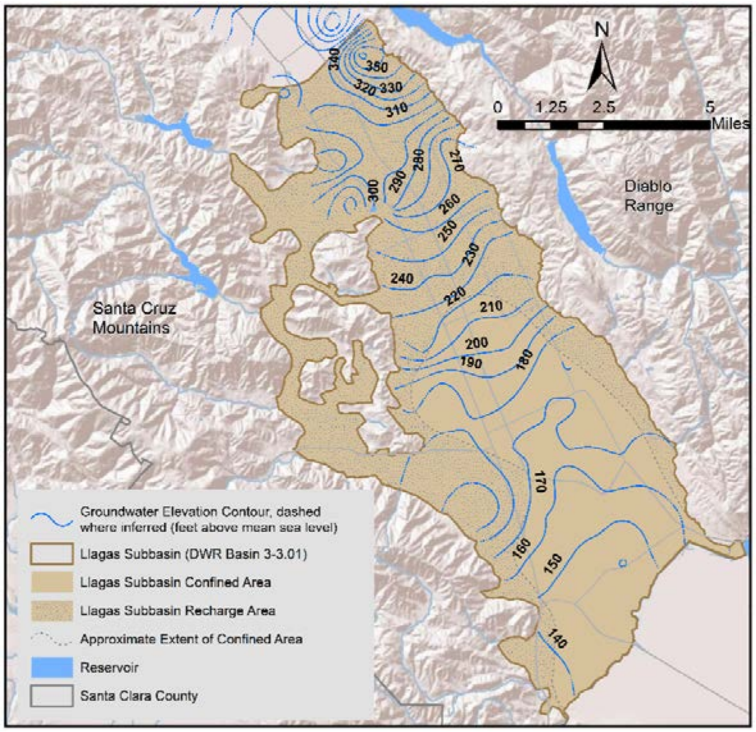
Figure 3-8. Groundwater Elevation in the Llagas Subbasin Regional Index Well (10S03E13D003)



Groundwater elevation contour maps depict the groundwater table or potentiometric surface associated with spring 2012 (Figure 3-9) and fall 2012 (Figure 3-10) for the Llagas Subbasin. Groundwater flows from north to south or slightly southeast, generally following the topography. The groundwater elevation is highest near Cochrane Road in Morgan Hill in the north, while the lowest elevation is typically found in the southernmost part of the subbasin near the Pajaro River. In the upper part of the subbasin, there are some flows from mountain or hill areas.

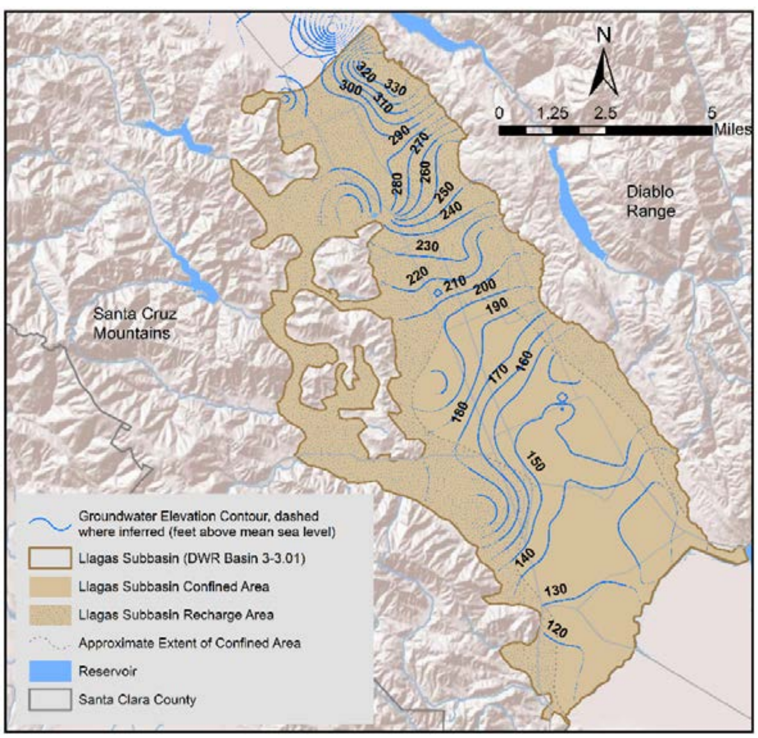
As indicated by the contour maps, typical seasonal patterns result in higher groundwater elevations in the spring and lower elevations in the fall. Contour maps for 2012 are included since 2012 represents the most recent year where water levels were not significantly affected by the extended drought. Recent groundwater elevation contours are included in the District’s Annual Groundwater Report for 2015.

Figure 3-9. Spring 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

Figure 3-10. Fall 2012 Groundwater Elevation Contours



Note: 2012 chosen to represent typical groundwater elevations not significantly impacted by extended drought.

3.2.2 Land Subsidence

Inelastic land subsidence has not been observed in the Llagas Subbasin. The District partnered with U.C. Berkeley researchers to use satellite imagery (InSAR) to evaluate the potential for subsidence in the Llagas Subbasin.[50] Using satellite imagery from 1992 to 2000, they concluded that there was no evidence of long-term subsidence. Seasonal ground surface movement was observed; rising and lowering by the same amount between the wet and dry seasons.

3.2.3 Surface Water and Groundwater Interaction

The District's managed recharge program includes significant recharge through many miles of stream channels over the recharge area, indicating groundwater and surface water generally are disconnected in these reaches. As described further below, the managed recharge program helps to maintain flows in these creeks, most of which would flow only intermittently otherwise. The District is not aware of any areas where groundwater pumping has a significant or unreasonable effect on interconnected surface water.

The District has a comprehensive surface water monitoring network to measure creek flows, comply with water rights reporting and reservoir restrictions, and meet environmental requirements. Stream gauging by the District is discussed in Chapter 7. Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose.

The portions of the Llagas Subbasin that are most likely to have surface water/groundwater interaction can be inferred through historical ecology maps prepared by the SFEI and the depth to shallow groundwater.[51] Figure 3-11 presents the historical ecology which maps areas such as wetlands, marshes, and willow groves that may be associated with shallow groundwater.[52] Some of these areas may have been present due to poorly draining soils rather than surface water/groundwater interaction. It is also important to note that this was the historical distribution prior to development and does not represent current or even recent conditions. The Uvas-Carnadero wetlands are located in the southwestern corner of the Llagas Subbasin. This area is the exit for all groundwater flowing towards San Benito County. Groundwater upwells in this area and maintains the wetlands. Along the southeast side of the Llagas Subbasin in the Soap Lake area is another large area of wetlands. The wetlands in this area are believed to be primarily due to flooding and poorly draining soils.

Figure 3-12 presents the extent of shallow groundwater in the Llagas Subbasin. This map shows the minimum depth to shallow groundwater (shallow groundwater condition) based on monitoring data from leaking underground storage tank investigations. Surface water/groundwater interactions would be most expected in the areas exhibiting a shallow depth to groundwater.

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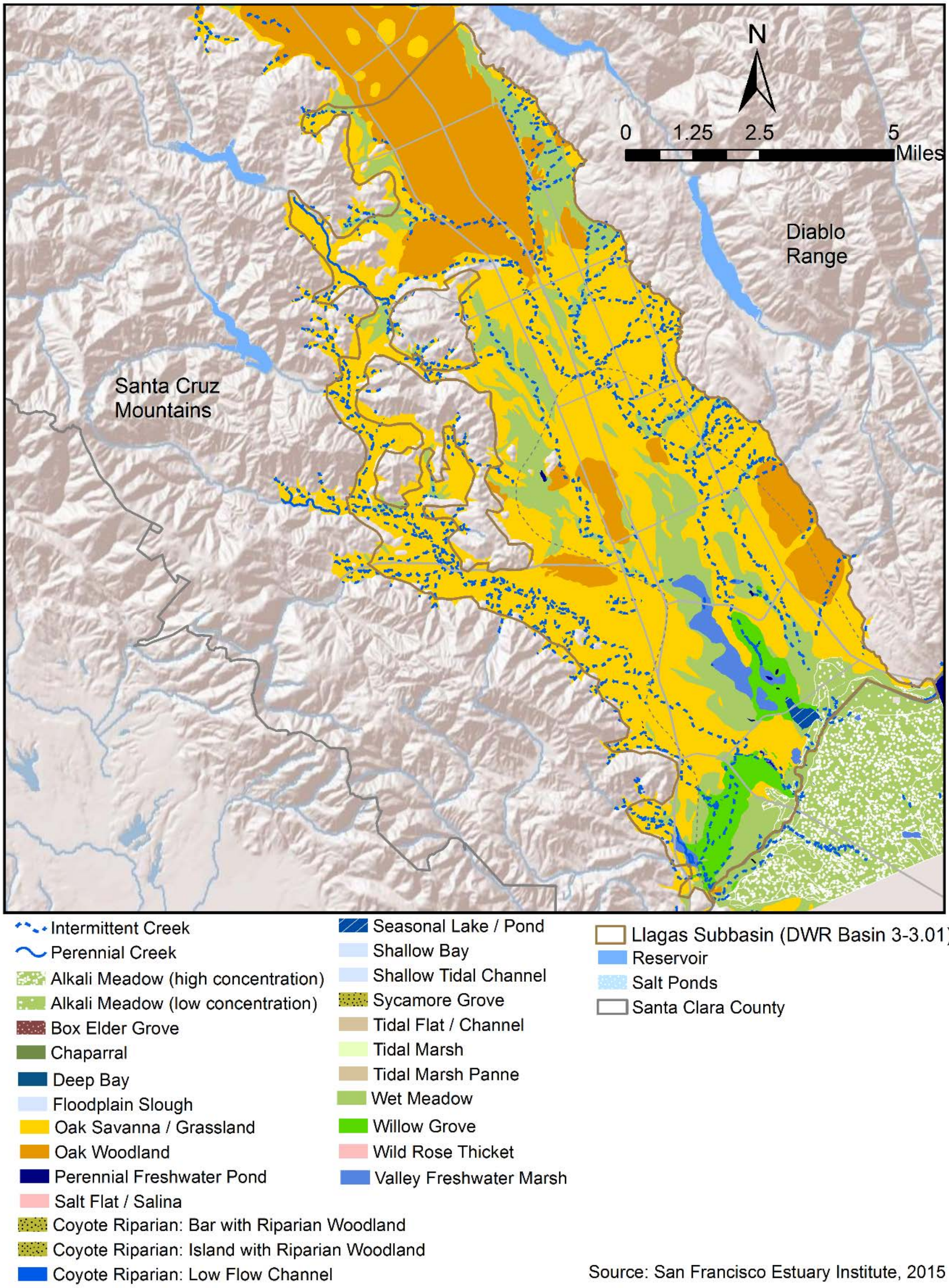
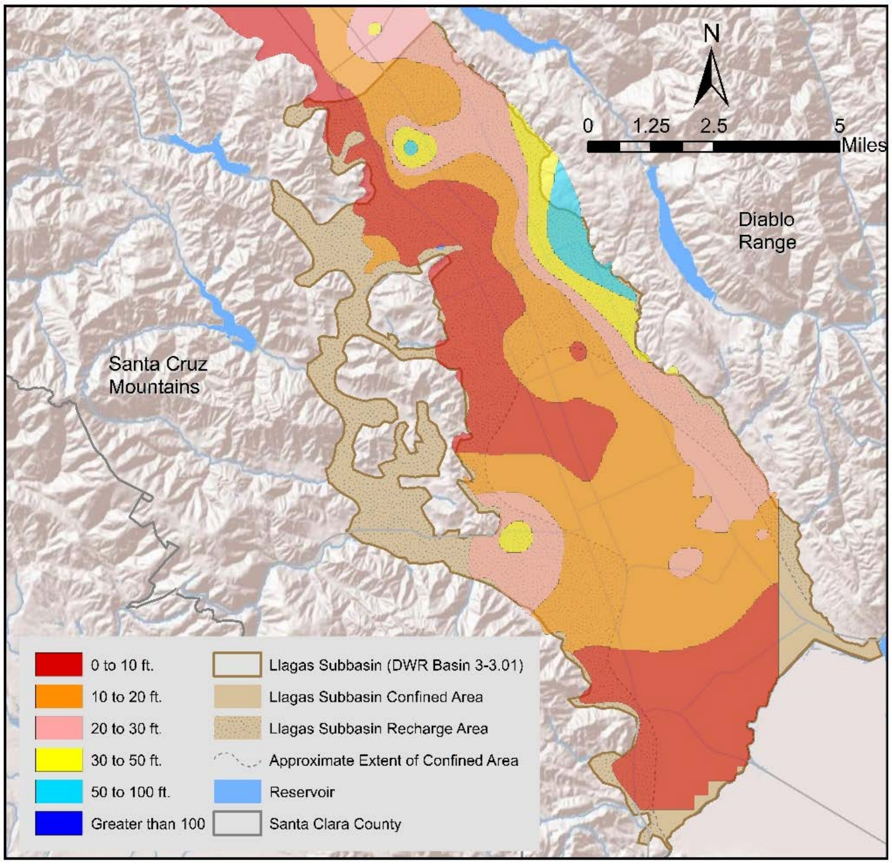
[50] Bürgmann and Johanson, South County Subsidence Study – Phase I and Phase II, University of California, Berkeley, 2005.
[51] SCVWD, GIS Coverage of Depth to First Groundwater, 2003.
[52] Grossinger et al., South Santa Clara Valley Historical Ecology Study, including Soap Lake, the Upper Pajaro River, and Llagas, Uvas-Carnadero, and Pacheco Creeks, 2008.

Figure 3-11. Llagas Subbasin Historical Ecology



Source: San Francisco Estuary Institute, 2015

Figure 3-12. Depth to First Groundwater in Llagas Subbasin



Based on most shallow water encountered at leaking underground storage tank sites as of 2003.

3.2.4 Groundwater Quality

The District has monitored and evaluated groundwater quality in the Llagas Subbasin for decades, with regular testing since the 1980s. Water quality data presented and summarized in this section represents data from the last ten-year period (2006-2015) collected by the District and other agencies. The primary source for data collected by other agencies is compliance sampling for public water supply wells submitted by water retailers to the State DDW. The District's groundwater monitoring and evaluation allows for an appraisal of current conditions and offers a consistent basis for detecting near-term and long-term trends.

The Llagas Subbasin generally produces groundwater of good quality that does not need treatment beyond disinfection at public water supply wells. However, the presence of elevated nitrate and perchlorate is an ongoing groundwater protection challenge, particularly in domestic wells, as presented in Figure 3-13 and described further in this section. Figures 3-14 and 3-15 show the relative concentrations of inorganic parameters with health-based MCLs (including nitrate and perchlorate) and aesthetic-based SMCLs[53] for the period 2006 to 2015 in the principal aquifer. Calcium, magnesium, and bicarbonate are the dominant dissolved constituents in the Llagas Subbasin.

[53] Maximum Contaminant Levels are health-based drinking water standards established by the California Division of Drinking Water or U.S. Environmental Protection Agency. Secondary MCLs are aesthetic-based standards established by these agencies to address aesthetic issues such as taste and odor. Figures 3-14 and 3-15 show only those inorganic parameters detected in moderate or high concentrations relative to the MCL or SMCL.

Variation from this includes groundwater with sodium bicarbonate and mixed cation-mixed anion character. The principal aquifer zone median TDS concentration was 371 mg/L in 2015.

Summary statistics for the Llagas Subbasin shallow and principal aquifer zones are presented in Tables 3-1and 3-2, respectively. These tables include only those parameters with a health-based MCL or aesthetic-based SMCL. Many parameters have been analyzed more than once at a particular well over the ten-year analysis period; in these cases, the most recent data is used. Tables 3-3 and 3-4 present the organic chemicals detected between 2006 and 2015 in the shallow and principal aquifers, respectively. Although some organic chemicals are detected in the Llagas Subbasin, detections are infrequent and are typically low concentrations.

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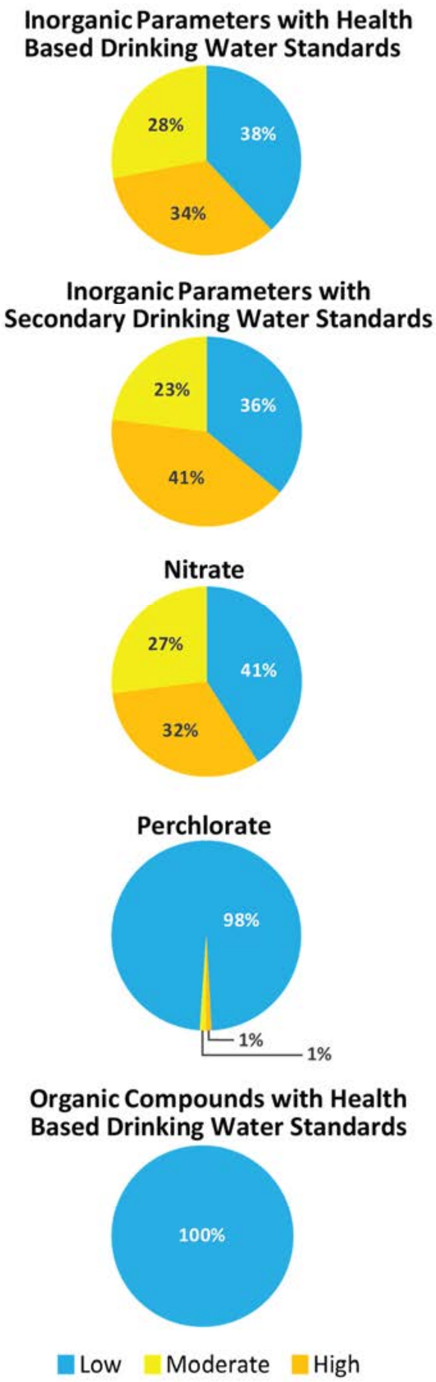
Figure 3-13. Llagas Subbasin Frequency of Drinking Water Standard Exceedances (2006-2015)



Inorganic Parameters

Inorganic parameters include trace elements (such as metals), major ions, nutrients, and radioactive parameters. These constituents are typically naturally occurring in the Llagas, leaching from rocks and sediments in contact with groundwater. Man-made sources include industrial and manufacturing facilities.

Water quality in principal aquifers is generally good for inorganic parameters with regard to health-based parameters, with the exception of nitrate, which is described further below. Perchlorate was detected above the MCL in one well sampled by the District or public water suppliers.

While health-based drinking water standards have been established for many inorganic parameters, some constituents also have secondary MCLs based on their ability to affect the aesthetic properties of water through taste, color, odor, or by causing staining or scale formation. The SMCL for these parameters may be a single value, or a range, with a lower (recommended) and upper threshold. As shown to the left, inorganic parameters with aesthetic-based standards are found in high concentrations in about a quarter of the principal aquifer, and in moderate concentrations in about 40% of the aquifer. Aluminum, iron, manganese, and specific conductance were detected above the SMCL.

Nitrate

Nitrate is naturally occurring in groundwater at low concentrations. However, man-made sources such as fertilizers and septic systems have impacted groundwater quality in the Llagas Subbasin and many other areas of California. Nitrate was detected above the MCL over a wide area of the Llagas Subbasin due to historic and ongoing agricultural use and septic systems. Nearly all detections of nitrate above the MCL occurred in domestic wells, which are not subject to regular testing or state drinking water standards. The District works with local stakeholders and regulatory agencies to reduce nitrate loading to groundwater and to reduce well owner exposure to elevated nitrate in drinking water.

Perchlorate

The occurrence of perchlorate in the Llagas Subbasin from a former highway safety flare plant has been substantially reduced due to ongoing managed recharge, removal of perchlorate from the source area, and ongoing remediation efforts. The perchlorate plume, which once extended about 10 miles from Morgan Hill to Gilroy, now extends approximately 3 miles to the San Martin Airport. Fewer than 10 domestic wells require treatment systems or replacement water.

Organic Compounds

Organic compounds include Volatile Organic Compounds (VOCs) and pesticides, and are present in many household, commercial, and industrial products. As shown to the left, groundwater quality in the principal aquifer zone is excellent with respect to organic compounds. There were some localized detections of VOCs in the Llagas Subbasin, but none were above ½ the MCL.

High: greater than the MCL, SMCL, or upper SMCL threshold

Moderate: greater than ½ the MCL or SMCL, or above the lower SMCL threshold

Low: not detected, less than ½ the MCL or SMCL, or below the lower SMCL threshold

Values represent the percentage of the principal aquifer zone area with concentrations in each category based on the most recent data from 2006 to 2015.

Figure 3-14. Llagas Subbasin Principal Aquifer Concentrations Relative to Primary Drinking Water Standards (2006-2015)

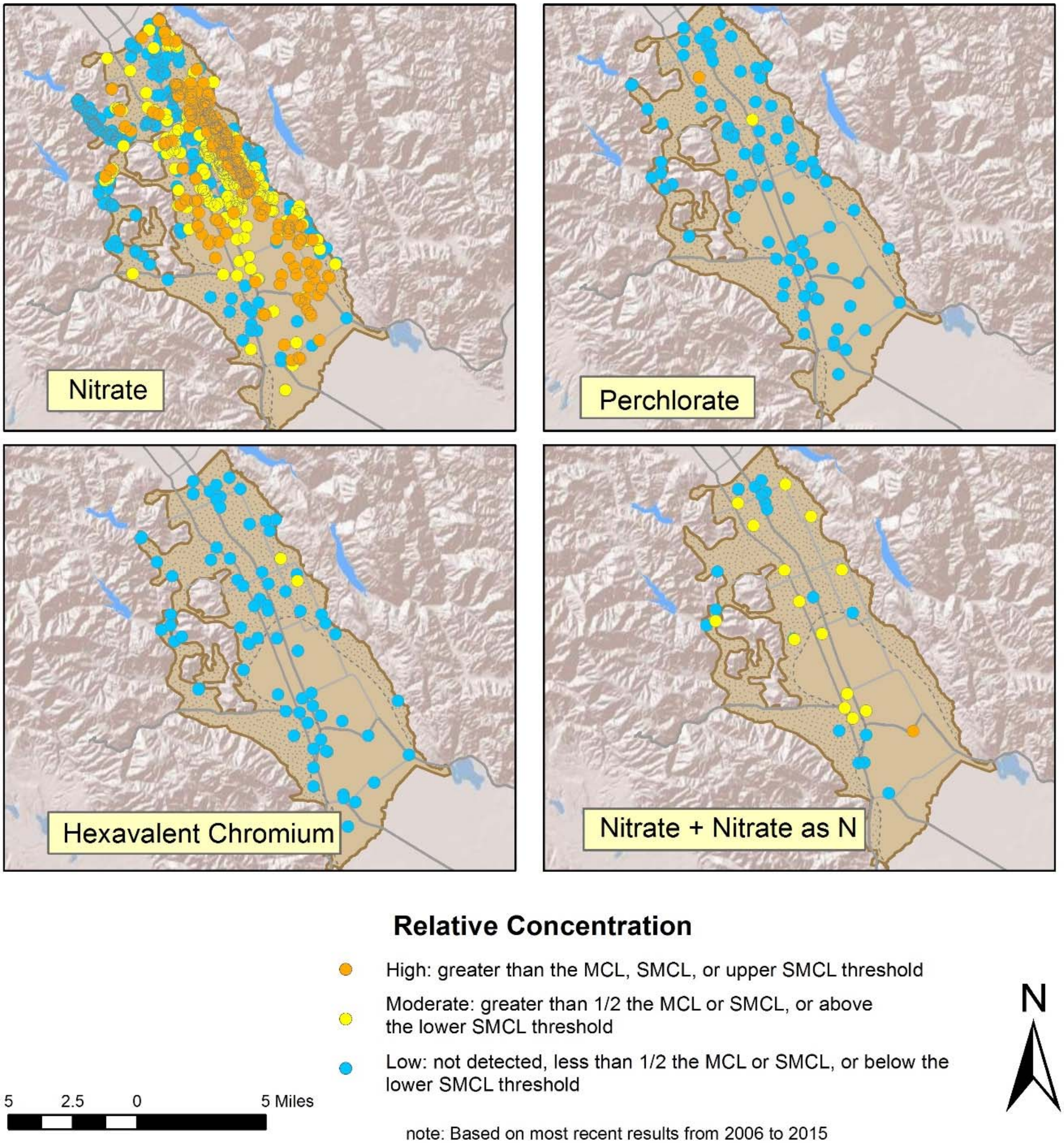


Figure 3-15. Llagas Subbasin Principal Aquifer Concentrations Relative to Secondary Drinking Water Standards (2006-2015)

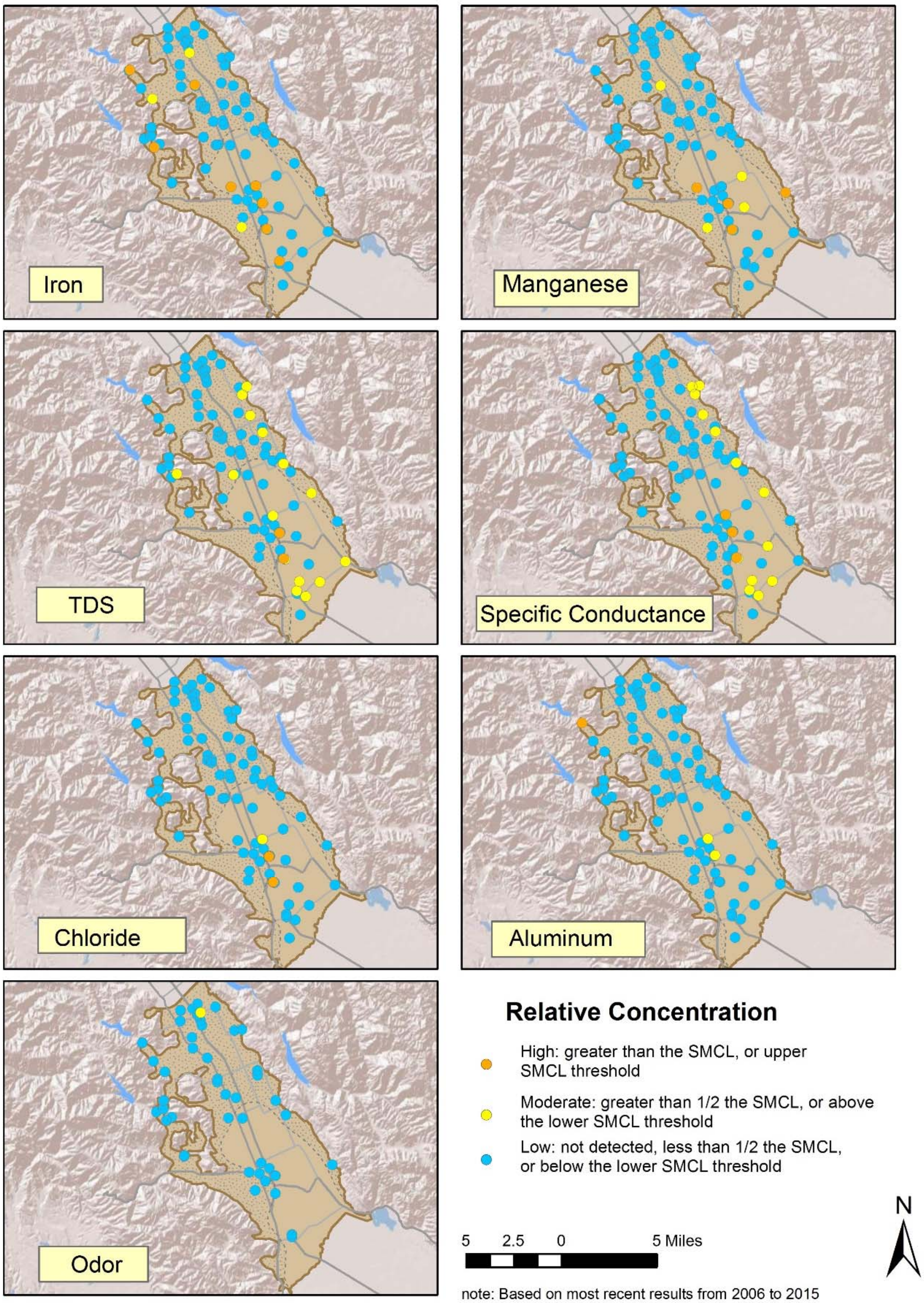


Table 3-1. Llagas Subbasin Shallow Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	28	29	133	39
Antimony (ug/L)	6	---	28	< 2	< 2	---
Arsenic (ug/L)	10	---	28	< 2	< 2	---
Asbestos (MFL)	7	---	0	---	---	---
Barium (ug/L)	1,000	---	28	100	365	112
Beryllium (ug/L)	4	---	28	< 1	< 1	---
Boron (ug/L)	---	---	28	116	308	173
Cadmium (ug/L)	5	---	28	< 1	< 1	---
Chloride (mg/L)	---	250	28	38	168	43
Total Chromium (ug/L)	50	---	28	1.4	6.4	1.9
Chromium VI (ug/L)	10	---	13	1.1	3.4	1.1
Color (Color Units)	---	15	0	---	---	---
Copper (ug/L)	---	1,000	28	2.2	6.8	2.1
Cyanide (ug/L)	150	---	0	---	---	---
Fluoride (mg/L)	2	---	28	0.09	0.18	0.08
Foaming Agents (MBAS) (ug/L)	---	500	0	---	---	---
Iron (ug/L)	---	300	28	13	180	34
Lead (ug/L)	---	---	28	0.15	1.1	0.27
Manganese (ug/L)	---	50	28	3.0	99	12
Mercury (ug/L)	2	---	28	< 1	< 1	---
Nickel (ug/L)	100	---	28	2.2	11	3.1
Nitrate (as N) (mg/L)	10	---	28	10.7	43.2	12.7
Nitrate + Nitrite (as N) (ug/L)	10,000	---	0	---	---	---
Nitrite (as N) (ug/L)	1,000	---	0	---	---	---
Odor - Threshold (Odor Units)	---	3	0	---	---	---
Perchlorate (ug/L)	6	---	28	< 4	< 4	---
Selenium (ug/L)	50	---	28	< 5	< 5	---
Silver (ug/L)	---	100	28	< 1	< 10	---
Specific Conductance (uS/cm)	---	600	27	709	1,340	488
Sulfate (mg/L)	---	250	28	52	142	49
Thallium (mg/L)	2	---	28	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	28	461	813	212
Turbidity (NTU)	---	5	24	0.27	4.1	1.1
Zinc (ug/L)	---	5,000	28	1.8	40	5.9

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 3-2. Llagas Subbasin Principal Aquifer Zone Water Quality Summary (2006-2015)

Parameter[1]	MCL[2]	SMCL[3]	n[4]	Results[5]		
				50th Percentile (median	95th Percentile	IQR
Aluminum (ug/L)	1,000	200	99	14	66	19
Antimony (ug/L)	6	---	99	< 2	< 6	---
Arsenic (ug/L)	10	---	94	0.60	2.4	0.72
Asbestos (MFL)	7	---	8	< 0.2	< 0.2	---
Barium (ug/L)	1,000	---	96	99	305	95
Beryllium (ug/L)	4	---	93	< 1	< 1	---
Boron (ug/L)	---	---	46	111	304	94
Cadmium (ug/L)	5	---	98	< 1	< 1	---
Chloride (mg/L)	---	250	92	42	158	35
Total Chromium (ug/L)	50	---	99	1.5	6.7	2.0
Chromium VI (ug/L)	10	---	78	1.2	3.1	1.6
Color (Color Units)	---	15	43	0.58	15	2.0
Copper (ug/L)	---	1,000	90	2.4	22	5.0
Cyanide (ug/L)	150	---	59	< 100	< 100	---
Fluoride (mg/L)	2	---	99	0.08	0.29	0.09
Foaming Agents (MBAS) (ug/L)	---	500	46	0.01	0.10	0.02
Iron (ug/L)	---	300	94	11	551	52
Lead (ug/L)	---	---	98	< 5	< 5	---
Manganese (ug/L)	---	50	90	2.2	71	8.6
Mercury (ug/L)	2	---	98	< 1	< 1	---
Nickel (ug/L)	100	---	98	0.95	5.1	1.4
Nitrate (as N) (mg/L)	10	---	118	5.6	14.2	7.1
Nitrate + Nitrite (as N) (ug/L)	10,000	---	36	3,950	11,400	3,525
Nitrite (as N) (ug/L)	1	---	71	< 0.400	< 0.400	---
Odor - Threshold (Odor Units)		3	49	0.90	1.2	0.20
Perchlorate (ug/L)	6	---	106	< 4	<4	---
Selenium (ug/L)	50	---	98	< 5	< 5	---
Silver (ug/L)	---	100	91	< 10	< 10	---
Specific Conductance (uS/cm)	---	600	105	590	1,216	227
Sulfate (mg/L)	---	250	91	35	87	13
Thallium (mg/L)	2	---	99	< 1	< 1	---
Total Dissolved Solids (mg/L)	---	500	93	370	759	137
Turbidity (NTU)	---	5	87	0.30	3.6	0.70
Zinc (ug/L)	---	5,000	92	6.9	120	20

Table includes District monitoring data from monitoring and domestic wells and public water system data reported to the CA Division of Drinking Water (DDW). The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet. For parameters analyzed more than once at a given well over the 10-year period, the most recent data is used.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units
2. Maximum Contaminant Level, or health-based drinking water standard, specified in Title 22 of the California Code of Regulations.
3. Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed.
4. n = number of wells sampled for each parameter.
5. For results with multiple reporting limits, the median, Inter quartile range (IQR) and 95th percentile were computed using the Maximum Likelihood Estimate (MLE) method.

Table 3-3. Llagas Subbasin Shallow Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Chloroform (THM)	---	26	8	18
1,1,1-Trichloroethane	200	26	4	0.80
Methyl-Tert-Butyl-Ether (MTBE)	13	26	4	0.70
N-Nitrosodi-n-butylamine (NDBA)	---	20	10	3.4

The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
"---" indicates there is no established MCL.

Table 3-4. Llagas Subbasin Principal Aquifer Zone Organic Parameter Detections (2006-2015)

Parameter	Primary MCL (ug/L)	Wells Tested	Percent of Wells Tested with Detection (%)	Maximum Concentration (ug/L)
Bromodichloromethane (THM)	---	90	1	2.2
Bromoform(THM)	---	90	4	3.6
Dibromochloromethane (THM)	---	90	4	3.3
Chloroform (THM)	---	90	1	1.0
Chloromethane	---	88	1	0.97
N-Nitrosodimethylamine (NDMA)	---	23	4	2.1
Tetrachloroethene (Perchloroethene)	5	90	3	4.2
1,2-Dichloropropane	5	90	1	1.1
Dichlorodifluoromethane (Freon 12)	---	88	1	0.9
Trichloroethene	5	90	1	21
Tert-Butyl Alcohol	---	87	2	3.9
N-Nitrosodi-n-butylamine(NDBA)	---	23	22	6.2
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	90	2	3.9
Total Trihalomethanes (THM)	80	18	22	9.7

The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.

"---" indicates there is no established MCL.

3.2.5 Salt Water Intrusion

There are no salt water bodies near the Llagas Subbasin, so no salt water intrusion has been observed and the subbasin is not vulnerable to salt water intrusion.

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CHAPTER 4 – WATER SUPPLIES, DEMANDS AND BUDGET

This section presents information on current water demands, supplies, and groundwater budget for the Santa Clara and Llagas subbasins, as well as future demands.

4.1 COUNTYWIDE WATER SUPPLY SOURCES

Santa Clara County has a diverse water supply portfolio, with sources including local surface water, natural groundwater, imported water, and recycled water.

4.1.1 Local Surface Water

The District currently has 20 appropriative water rights licenses and 1 filed water right permit with the State Water Resources Control Board totaling over 227,000 acre-feet per year (AFY). Local rainfall runoff is captured in the District's reservoirs and is sent to drinking water treatment plants or diverted downstream for groundwater recharge. The total storage capacity of the District's reservoirs is about 169,000 AF, though several are operating at restricted capacity due to seismic stability concerns. Table 4-1 summarizes reservoir capacities, restrictions, and impacts from restrictions.

Table 4-1. Santa Clara County Reservoir Capacities

Reservoir/ Dam	Reservoir Capacity (Acre-feet)	Restricted Capacity (Acre-feet)	Restricted Capacity (%)	Use
Anderson	90,373	61,810	68	Groundwater recharge, Treated for drinking water
Coyote	23,244	12,382	53	Groundwater recharge, Treated for drinking water
Almaden	1,586	1,472	93	Groundwater recharge, Treated for drinking water
Calero	9,934	4,585	46	Groundwater recharge, Treated for drinking water
Guadalupe	3,415	2,218	65	Groundwater recharge
Stevens Creek	3,138	No restriction	N/A	Groundwater recharge
Lexington	19,044	No restriction	N/A	Groundwater recharge
Chesbro	7,945	No restriction	N/A	Groundwater recharge
Uvas	9,835	No restriction	N/A	Groundwater recharge
Vasona	495	No restriction	N/A	Groundwater recharge
TOTAL	**169,009**	**122,924**		

Most of the reservoirs are sized for annual operations, storing water in winter for use in summer and fall. The exception is the Anderson-Coyote reservoir system, which provides valuable carryover of supplies from year to year.

In addition, San Jose Water Company and Stanford University have surface water rights that contribute to local surface water availability for their customers.

4.1.2 Groundwater

The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams (natural groundwater recharge). In addition, the groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins also provide some natural filtration of surface water as it percolates through the soil and rock. Unlike surface water, most groundwater in the county can be used for drinking water without additional treatment. Lastly, the groundwater subbasins provide water storage, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years.

4.1.3 Imported Water

District imported water is conveyed through the Sacramento-San Joaquin Delta and then pumped and delivered to the county through the South Bay Aqueduct, which carries water from the SWP, and through the San Felipe Division, which brings in water from the federal CVP.

The District has a contract for 100,000 AFY from the SWP and a contract for 152,500 AFY from the CVP. The actual amount of water delivered is typically less than these contractual amounts and depends on hydrology, conveyance limitations, and environmental regulations. Supplemental imported water is acquired through transfers and exchanges as needed and available. In addition, the District is able to put some imported water supplies into carryover and Semitropic Groundwater Bank for later withdrawal and use. Imported supplies are delivered to the District's three drinking water treatment plants, groundwater recharge facilities, and raw water irrigation customers.

Eight retailers in the county have contracts with the SFPUC to receive water from the SFPUC Regional Water System. The eight retailers, considered to be wholesale customers of SFPUC, are the cities of Palo Alto, Mountain View, Sunnyvale, Santa Clara, San José, and Milpitas; Purissima Hills Water District; and Stanford University. In addition, NASA-Ames is considered a retail customer of SFPUC. The District does not control or administer SFPUC supplies in the county, but the supply reduces the demands on District sources of supply.

4.1.4 Recycled and Purified Water

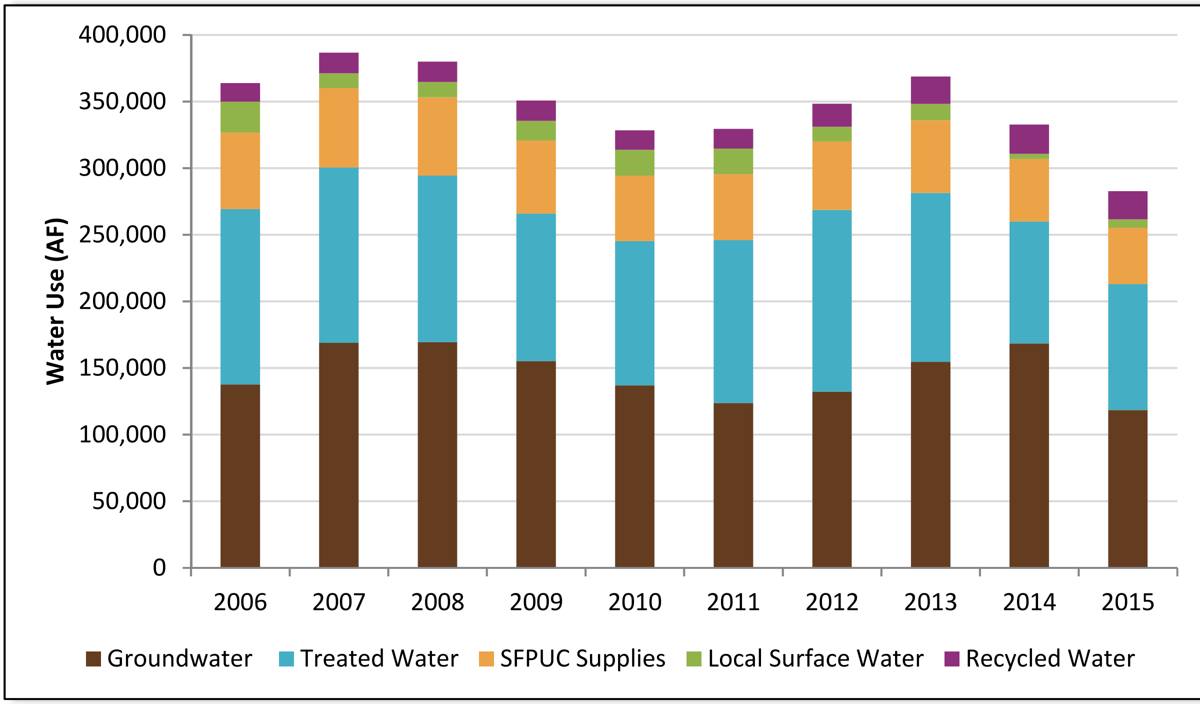
A growing source of water supply for Santa Clara County is recycled and purified water. Using recycled water helps augment drinking water and groundwater supplies through in-lieu recharge; provides a reliable, drought-proof, locally-controlled water supply; and reduces reliance on imported water. Recycled water is currently about 5 percent (or about 20,000 AFY) of the county's supply and is distributed for non-potable uses such as landscape and agricultural irrigation, industrial cooling, and dual plumbed facilities. This recycled water is produced at the four wastewater plants in the county – Palo Alto, Sunnyvale, San Jose/Santa Clara, and South County Regional Wastewater Authority (SCRWA).

In addition, the District is in the process of developing at least 20,000 AFY and up to 45,000 AFY of potable reuse capacity. The District is currently in the process of developing a countywide recycled and purified water master plan that will outline its approach to achieving its target - that recycled water, including both non-potable and potable reuse, is 10 percent of the county's water supply by 2025.

4.2 WATER USE

Annual countywide water use from 2006 to 2015 averages 347,000 acre-feet, with groundwater pumping, treated water deliveries, and SFPUC supplies accounting for about 90% of water used (Figure 4-1).

Figure 4-1. Countywide Water Use by Source (2006 to 2015)



4.3 CONJUNCTIVE WATER MANAGEMENT

The District does not typically deliver groundwater to customers, but does have some limited emergency groundwater pumping capacity. Instead, it manages the groundwater subbasins for the benefit of its groundwater customers and the county at large. The District's water supply strategy since the 1930s has been to maximize conjunctive use, the coordinated management of surface and groundwater supplies, to enhance water supply reliability and avoid undesirable results like chronic overdraft, land subsidence, and salt water intrusion.

Local groundwater resources make up the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water management activities in order to reliably meet the needs of county residents, businesses, agriculture, and the environment. These activities include managed recharge of imported and local supplies and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling.

4.3.1 Managed Recharge

The District's managed recharge program uses both runoff captured in local reservoirs and imported water delivered by the raw water conveyance system to recharge groundwater through more than 390 acres[54] of recharge ponds

[54] The District operates many recharge ponds (Appendix D) with a total water surface area of approximately 265 acres. The total effective percolation area, however, is around 390 acres.

and over 90 miles of local creeks (Figure 4-2).

On average, the District recharges about 100,000 AF of local and imported water each year. Managed recharge accounts for the majority of groundwater used in the county as shown in Figure 4-3. A detailed description of the District's managed recharge facilities can be found in Appendix D.

The estimated operational storage capacity of the groundwater subbasins is up to 548,000 AF. The District's managed recharge capacity is up to about 144,000 AFY. Maintaining the District's active managed recharge program requires ongoing operational planning for the distribution of local and imported water to recharge facilities; maintenance and operation of reservoirs, diversion facilities, distribution systems, and recharge ponds; and the maintenance of water supply contracts, water rights, and relevant environmental clearance.

Figure 4-2. Managed Recharge Facilities

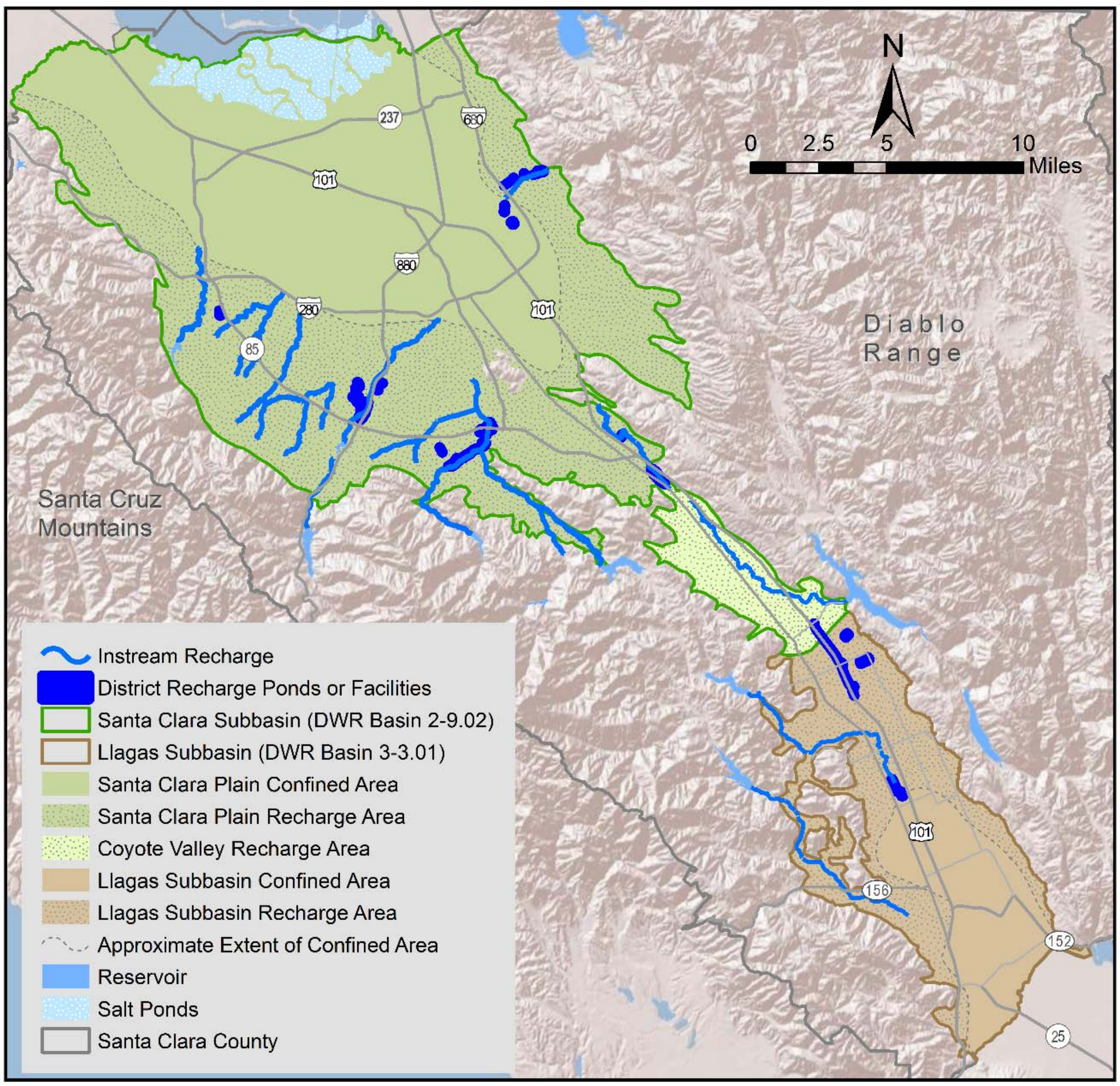
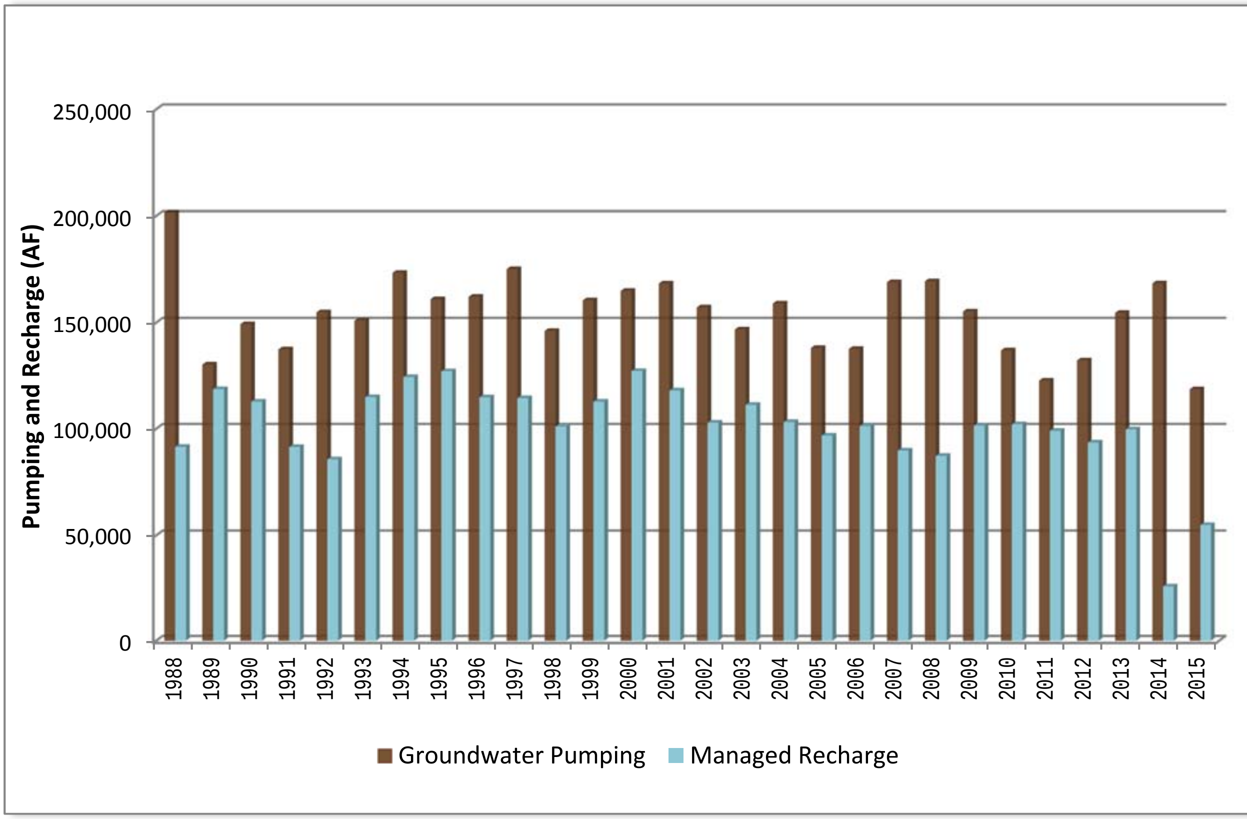


Figure 4-3. Santa Clara County Groundwater Pumping and Managed Recharge



4.3.2 In-Lieu Recharge

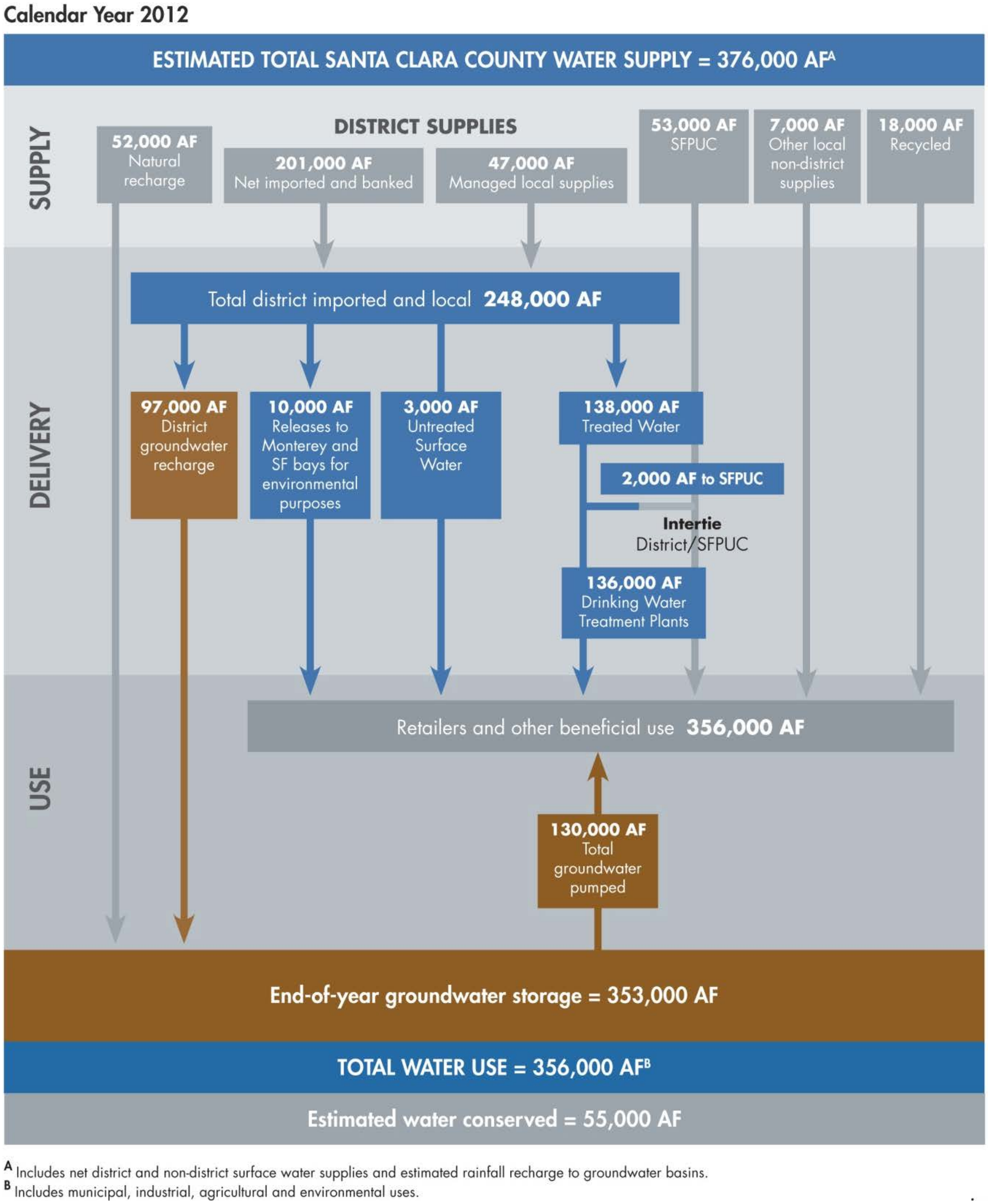
Just as important as direct replenishment through managed recharge are in-lieu recharge programs, including treated water deliveries, water recycling, and water conservation. These activities help maintain groundwater levels and storage by reducing pumping demands. By meeting demands that would otherwise be met by groundwater, these programs provide in-lieu recharge as if the groundwater subbasins had been recharged by that amount.

The District owns and operates three drinking water treatment plants, distributing treated surface water to 7 of the 13 water retailers in the Santa Clara Plain. Combined, the District treatment plants have a processing rate of over 200 million gallons per day, with treated water deliveries approaching 130,000 AFY in a normal year. SFPUC deliveries to several retailers and surface water delivered by the District, San Jose Water Company, and Stanford University also reduce the need for pumping.

The District encourages recycled water development in the county through partnerships with the four local wastewater agencies and through technical assistance. An estimated 21,000 AF of recycled water was used in 2015, offsetting demands that might otherwise have been met through other potable supplies such as additional groundwater pumping. Similarly, in fiscal year 2016, the District's water conservation program saved an estimated 69,000 AF of water.

Figure 4-4 shows the supply and distribution of District and other water supplies in Santa Clara County.

Figure 4-4. Santa Clara County Supplies and Water Use

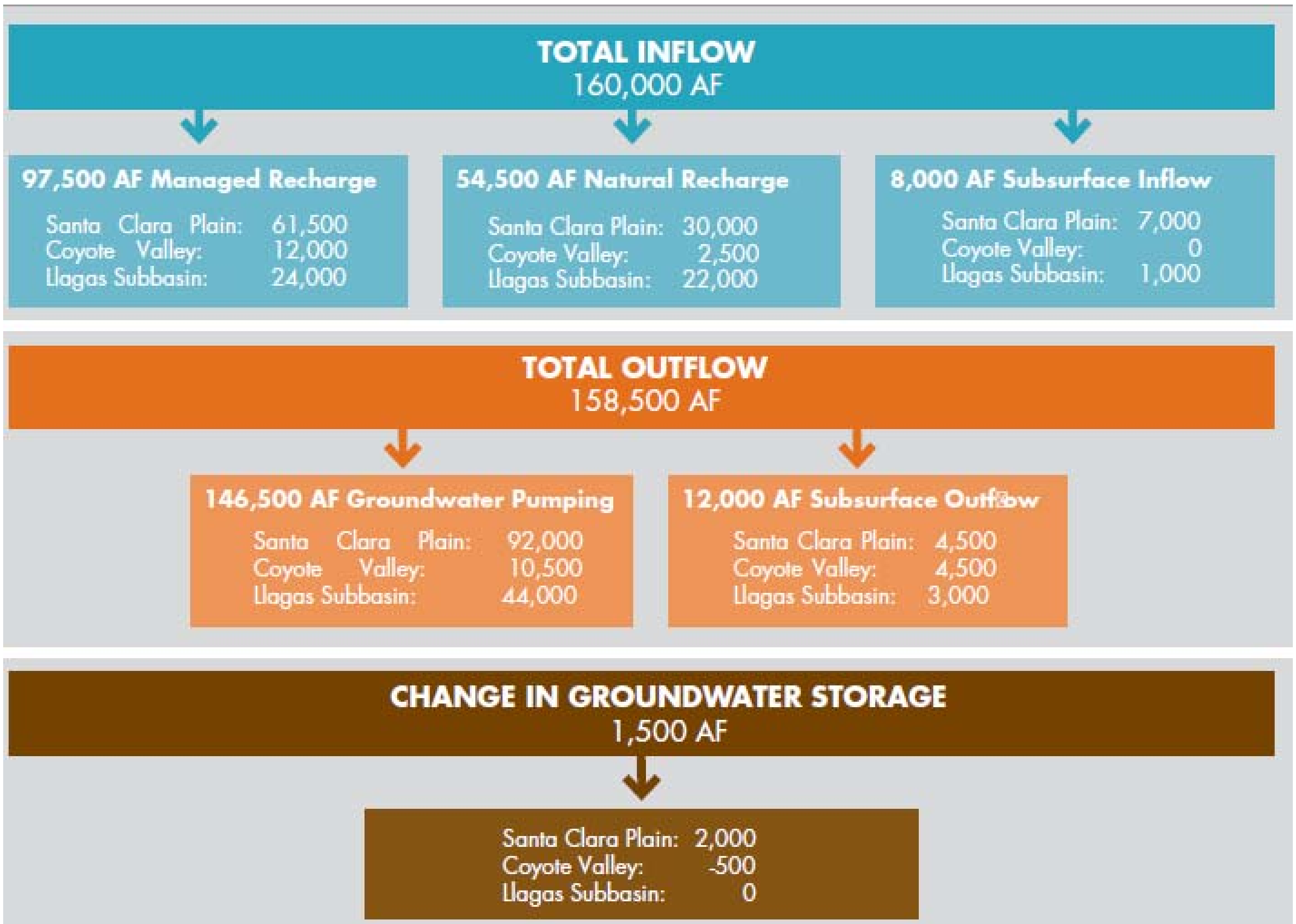


From FY 13-14 Protection and Augmentation of Water Supplies Report (District, 2013)
Calendar Year 2012 represents the most recent year not significantly affected by extended drought.

4.4 GROUNDWATER BUDGET

This section presents detailed groundwater budgets for the Santa Clara and Llagas subbasins for calendar years 2003 through 2012. This period was chosen to represent recent longer-term conditions that include wet, normal, and dry years but are not significantly affected by recent, exceptionally dry years. As shown in Figure 4-5, groundwater pumping far exceeds natural replenishment and District managed recharge is needed to ensure a balanced water budget. The average change in storage over this period is 1,500 AF for the Santa Clara Subbasin and zero for the Llagas Subbasin, indicating the subbasins are in long-term balance.

Figure 4-5. Groundwater Budget for the Santa Clara and Llagas Subbasins (2003-2012)



4.4.1 Santa Clara Subbasin

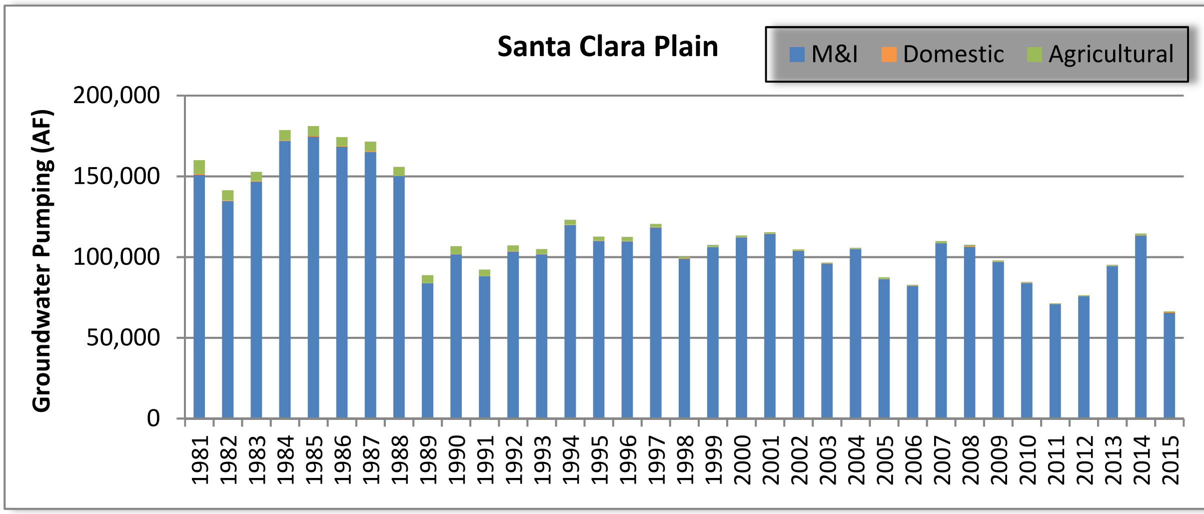
Groundwater is an important water supply source in the Santa Clara Subbasin, particularly in the Coyote Valley, which is entirely reliant on groundwater with the exception of minor surface water use. This section presents detailed information on the water budget for the Santa Clara Subbasin.

4.4.1.1 Groundwater Pumping

The long-term average groundwater pumping in the Santa Clara Subbasin is 103,000 AFY, including the Santa Clara Plain and Coyote Valley. This is based on average pumping from 2003 to 2012, which was chosen to represent typical conditions not significantly affected by drought.

Average 2003 to 2012 groundwater pumping in the Santa Clara Plain is 92,000 AFY, with maximum and minimum annual pumping of 110,000 AF and 71,000 AF, respectively. Nearly all groundwater used in the Santa Clara Subbasin (99%) is for municipal and industrial uses with only 1% for agriculture and domestic purposes (Figure 4-6). Pumping by water retailers accounts for over 90% of pumping in the Santa Clara Plain.

Figure 4-6. Santa Clara Plain Groundwater Pumping by Use



Groundwater serves nearly all beneficial uses in the Coyote Valley, with only small amounts of raw surface water used. Average 2003 to 2012 pumping is 11,000 AFY, with maximum and minimum annual amounts of 14,000 AF and 7,000 AF, respectively. Most groundwater used (66%) supports municipal and industrial uses, with 32% used for agriculture, and 2% for domestic purposes (Figure 4-7). Pumping by water retailers accounts for about 55% of pumping in the Coyote Valley.

Figure 4-7. Coyote Valley Groundwater Pumping by Use

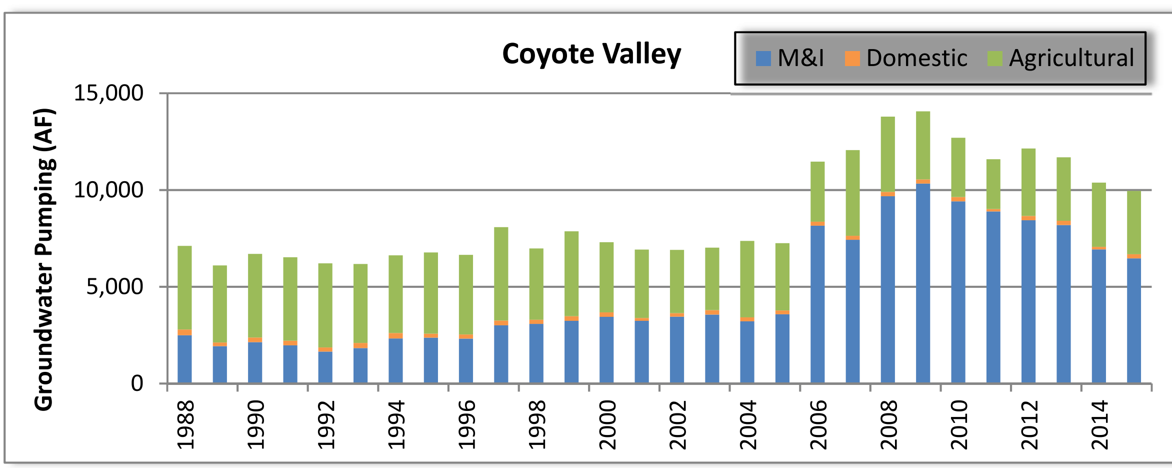
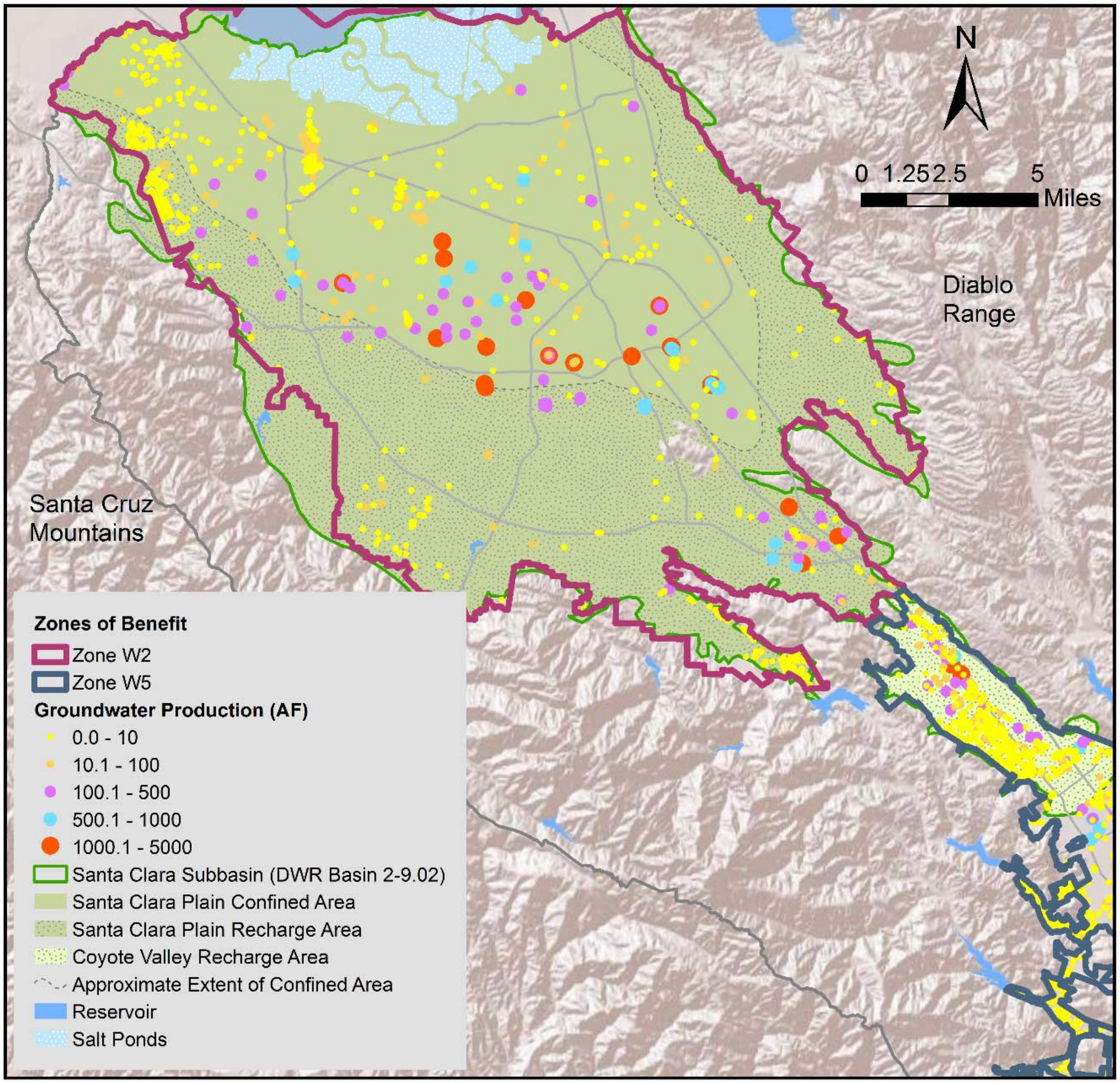


Figure 4-8 shows the distribution of pumping in the Santa Clara Subbasin based on 2012 (the most recent year not significantly affected by the extended drought).

Figure 4-8. Santa Clara Subbasin Pumping Distribution (2012)



SGMA defines the sustainable yield as the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.[55] Quantifying sustainable yield is challenging as it is highly dependent on hydrology, available water supplies, managed recharge, site-specific pumping, and basin conditions. While sustainable yield is defined as the maximum amount that may be withdrawn annually, estimating this highly complex concept with a single value may imply that volume can be pumped every year while maintaining sustainable conditions. Certainly, this is not the case.

[55] California Department of Water Resources website: http://water.ca.gov/groundwater/sgm/definitions.cfm

Previous analysis has estimated that annual Santa Clara Plain pumping should not exceed 200,000 AF in any one year,[56] and current production does not exceed this limit. While that volume could potentially be pumped within a year without causing land subsidence, the District does not rely on this estimate for annual operations or long-term water supply planning. There is no similar estimate for the Coyote Valley, which is small, relatively shallow, and transmissive, with limited storage capacity.

The District does not manage to a particular value for sustainable yield, but instead manages groundwater to maintain sustainable conditions through annual operations and long-term water supply planning. Annual operations planning considers available water supplies and projected demands in determining the source and volume of water to be delivered for managed recharge, drinking water treatment, or other use. Each year, the District evaluates the projected end of year groundwater storage to determine if short-term water use reduction is needed in accordance with the Water Shortage Contingency Plan. The District's long-term water supply planning efforts account for maintaining adequate groundwater supplies and reserves in related water system modeling and analysis.

The Santa Clara Subbasin is not in a condition of chronic overdraft, and the hydrographs presented in Chapter 2 and balanced water budgets in this chapter demonstrate that long-term average yields are sustainable. The District makes investments, implements programs, and modifies water supply operations as needed to maintain sustainable conditions now and in the future.

4.4.1.2 Groundwater Recharge

Recharge sources in the Santa Clara Subbasin include District managed recharge and natural, or uncontrolled, recharge from the deep percolation of rainfall, septic system and irrigation return flows, and natural seepage through creeks. The District's managed recharge systems in the Santa Clara Subbasin are summarized below in Table 4-2, with more detail provided in Appendix D.

Table 4-2. Santa Clara Subbasin Managed Recharge Facility Summary

Managed Recharge System	Approximate Recharge Capacity (AFY)	Water Supply Sources	Year Operations Began
Guadalupe	25,000	Local watersheds, SWP, CVP	1932
Los Gatos	30,000	Local watersheds, SWP, CVP	1934
Penitencia	7,000	Local watersheds, SWP	1934
West Side	15,000	Local watersheds, SWP, CVP	1935
Coyote	27,000[1]	Local watersheds, CVP	1934

1. The Coyote Recharge System can also provide water to the Llagas Subbasin.

Natural, or uncontrolled, recharge from precipitation, return flows, seepage from creeks, and mountain front recharge is estimated to range between 15,000 and 61,000 AFY for the Santa Clara Subbasin.

[56] Santa Clara Valley Water District, Operational Storage of Santa Clara Valley Groundwater Basin, 1999.

4.4.1.3 Groundwater Storage

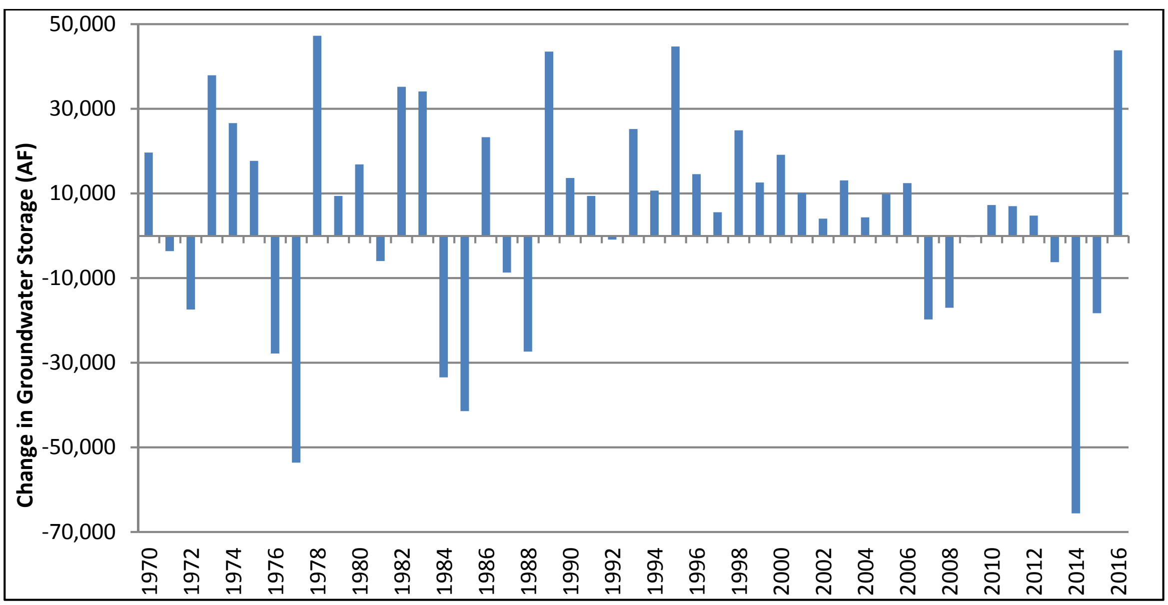
Large amounts of water can be stored in the Santa Clara Subbasin, with total storage capacity estimated to be as high as 1.9 million AF.[57] However, only a fraction of this water can be extracted practically using wells and without causing undesirable results like land subsidence and salt water intrusion.

The District has estimated the operational storage capacity of the Santa Clara Plain to be 350,000 AF using iterative simulations of water supply system models and the groundwater flow model.[58] Using hydrology, demands, and operational data for the period of 1967-1996, this represents the maximum cumulative storage in the Santa Clara Plain without initiating land subsidence or causing high groundwater nuisance conditions. The District will evaluate this estimate using updated data and the calibrated groundwater flow model to determine if it needs to be refined.

The District has previously estimated the operational storage capacity of the Coyote Valley to range between 23,000 and 33,000 AF.[59] This represents the product of specific yield,[60] area, and the elevation difference between high and low groundwater surfaces. Groundwater level data for 1982-1983 was used for the high surface and 1976-1977 for low conditions. While the District developed a groundwater flow model for the Coyote Valley since operational storage capacity was last estimated, pumping and recharge data is not available before 1987 when the District assumed groundwater management of the Coyote Valley. The District will evaluate the estimate of operational storage capacity to determine if it needs to be refined.

Figures 4-9 and 4-10 show the estimated annual change in groundwater storage in the Santa Clara Plain and Coyote Valley, respectively. The former figure starts with the year 1970 and the latter with 1987 because the data in Coyote Valley only became available after the District merged with the Gavilan Water District.

Figure 4-9. Annual Change in Storage in the Santa Clara Plain (1970-2016)



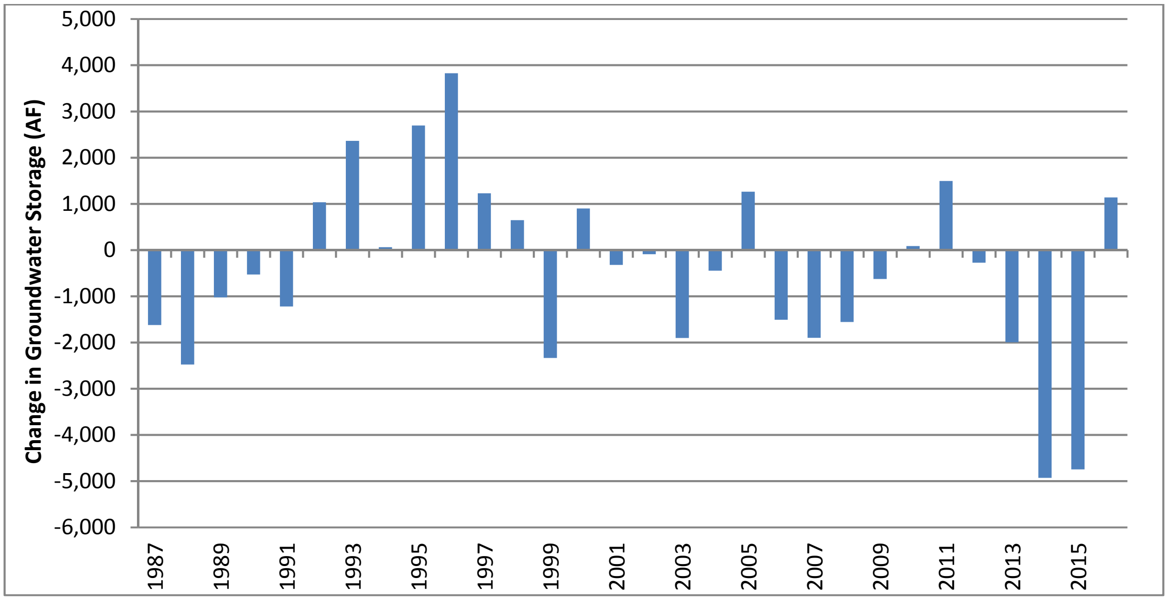
[57] California State Water Resources Board, Santa Clara Valley Investigation, 1955.

[58] Santa Clara Valley Water District, Operational Storage of Santa Clara Valley Groundwater Basin, 1999.

[59] Santa Clara Valley Water District, Operational Storage Capacity of the Coyote and Llagas Groundwater Subbasins, April 2002.

[60] Specific yield essentially represents the amount of water that can be released from a certain volume of aquifer.

Figure 4-10. Annual Change in Storage in the Coyote Valley (1987-2016)



4.4.1.4 Water Budget

A water budget for the Santa Clara Plain for calendar years 2003 through 2012 is shown in Table 4-3. The water budget is based on the District groundwater flow model for the Santa Clara Plain, and represents inflows and outflows for the principal aquifer. On average, about two-thirds of inflows to groundwater in the Santa Clara Plain come from the District's managed recharge program. Although the water budget can vary significantly from year to year, on average, there was a slight annual increase in storage by about 2,000 AFY for the Santa Clara Plain over this 10-year period.

Table 4-3. Santa Clara Plain Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	61,500
Natural Recharge[2]	30,000
Subsurface Inflow[3]	7,000
Total Inflow	98,500
Outflow	
Groundwater Pumping[4]	92,000
Subsurface Outflow[5]	4,500
Total Outflow	96,500
Change in Storage	2,000

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes the deep percolation of rainfall, natural seepage from creeks, and subsurface inflow from surrounding hills (mountain front recharge).
3. Subsurface inflow represents inflow from adjacent aquifer systems, including the Coyote Valley
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifers in San Mateo County, Alameda County, and beneath San Francisco Bay.

A water budget for the Coyote Valley for calendar years 2003 to 2012 is presented in Table 4-6. The water budget is based on the District groundwater flow model for the Coyote Valley, and represents inflows and outflows for the aquifer system. Recharge from rainfall is estimated to be small compared to the District's managed recharge in Upper Coyote Creek and natural recharge along Fisher Creek. Annual recharge is estimated to be about 14,500 AF per year, with approximately 80 percent of that coming from the District's managed recharge.

The primary Coyote Valley outflows are groundwater pumping and flow to the Santa Clara Plain, the latter of which is necessary to maintain water levels in the Santa Teresa area of the Santa Clara Plain. Over the 10-year period evaluated, the Coyote Valley has seen a slight decrease in storage by about 500 AF annually. However, based on measured water levels and pumping data, no negative impacts are observed in Coyote Valley where groundwater conditions are sustainable in large part due to the District's managed recharge program.

Table 4-4. Coyote Valley Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	12,000
Natural Recharge[2]	2,500
Subsurface Inflow[3]	0
Total Inflow	14,500
Outflow	
Groundwater Pumping[4]	10,500
Subsurface Outflow[5]	4,500
Total Outflow	15,000
Change in Storage	-500

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks.
3. Subsurface inflow represents inflow from adjacent aquifer systems.
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifer systems, including outflow to the Santa Clara Plain.

4.4.2 Llagas Subbasin

Groundwater is the primary water supply source in the Llagas Subbasin and is the sole source for drinking water. A small, but growing, portion of water use is served by recycled water, and there is also a small amount of raw surface water put to beneficial use. This section presents detailed information on the water budget.

4.4.2.1 Groundwater Pumping

The long-term average groundwater pumping in the Llagas Subbasin is 44,000 AFY. This is based on average pumping from 2003 to 2012, which was chosen to represent typical conditions not significantly affected by drought. The maximum annual pumping during that period was 48,000 AF and the minimum pumping was 39,000 AF. Groundwater use in the Llagas Subbasin is nearly evenly split between agricultural uses (50%) and municipal and industrial uses (45%), with 5% used for domestic purposes (Figure 4-11). Pumping by water retailers accounts for about 34% of pumping in the Llagas Subbasin.

Figure 4-11. Llagas Subbasin Groundwater Pumping by Use

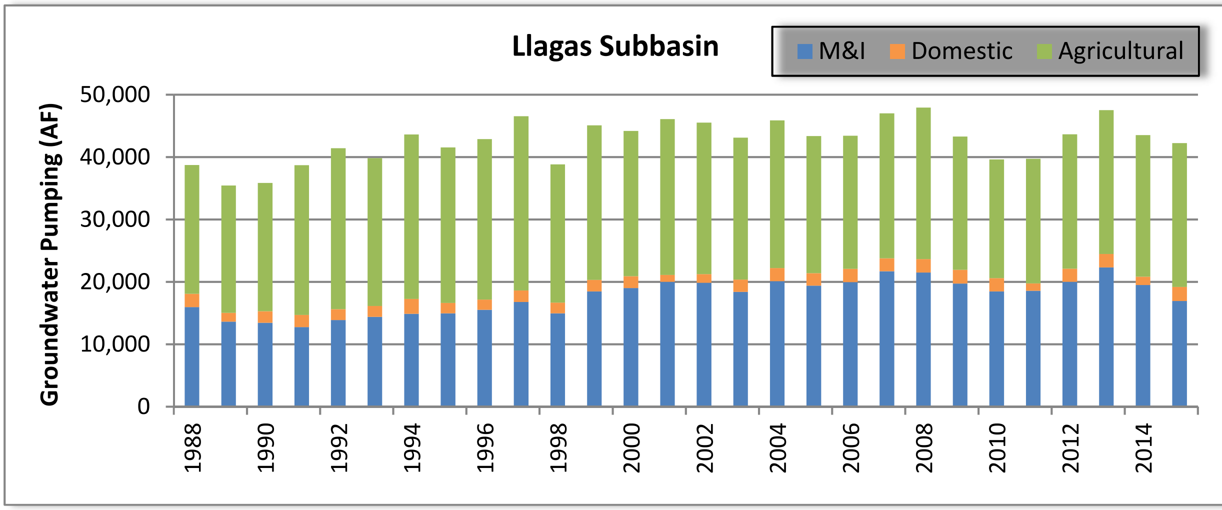
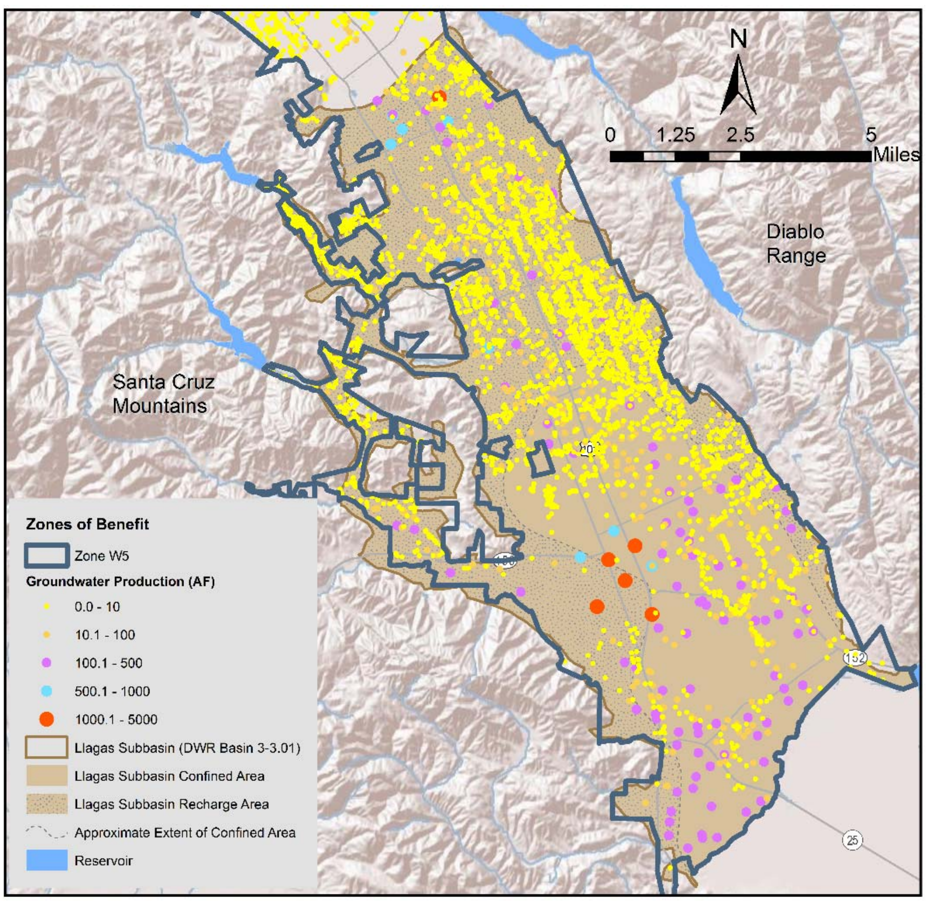


Figure 4-12 shows the distribution of pumping in the Santa Clara Subbasin based on 2012 (the most recent year not significantly affected by the extended drought).

Figure 4-12. Llagas Subbasin Pumping Distribution (2012)



SGMA defines the sustainable yield as the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.[61] Quantifying sustainable yield is challenging as it is highly dependent on hydrology, available water supplies, managed recharge, site-specific pumping, and basin conditions. While sustainable yield is defined as the maximum amount that may be withdrawn annually, estimating this highly complex concept with a single value may imply that volume can be pumped every year while maintaining sustainable conditions. Certainly, this is not the case.

The District does not manage to a particular value for sustainable yield, but instead manages groundwater to maintain sustainable conditions through annual operations and long-term water supply planning. Annual operations planning considers available water supplies and projected demands in determining the source and volume of water to be delivered for managed recharge or other use. Each year, the District evaluates the projected end of year groundwater storage to determine if short-term water use reduction is needed in accordance with the Water Shortage Contingency Plan. The District's long-term water supply planning efforts account for maintaining adequate groundwater supplies and reserves in related water system modeling and analysis.

The Llagas Subbasin is not in a condition of chronic overdraft, and the hydrographs presented in Chapter 3 and balanced water budget in this chapter demonstrate that long-term average yields are sustainable. The District makes investments, implements programs, and modifies water supply operations as needed to maintain sustainable conditions now and in the future.

4.4.2.2 Groundwater Recharge

Recharge sources in the Llagas Subbasin include District managed recharge and natural, or uncontrolled, recharge from the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks. The District's managed recharge systems in the Llagas Subbasin are summarized below in Table 4-5, with more detail provided in Appendix D.

Table 4-5. Llagas Subbasin Managed Recharge Facility Summary

Managed Recharge System	Approximate Recharge Capacity (AFY)	Water Supply Sources	Year Operations Began
Coyote	27,000[1]	Local watersheds, CVP	1934
Lower Llagas	21,000	Local watersheds	1955
Upper Llagas	19,000	Local watersheds, CVP	1955

1. The Coyote Recharge System also provides water to the Santa Clara Subbasin.

Natural, or uncontrolled, recharge from precipitation, return flows, seepage from creeks, and mountain front recharge is estimated to range between 15,000 and 30,000 AFY for the Llagas Subbasin.

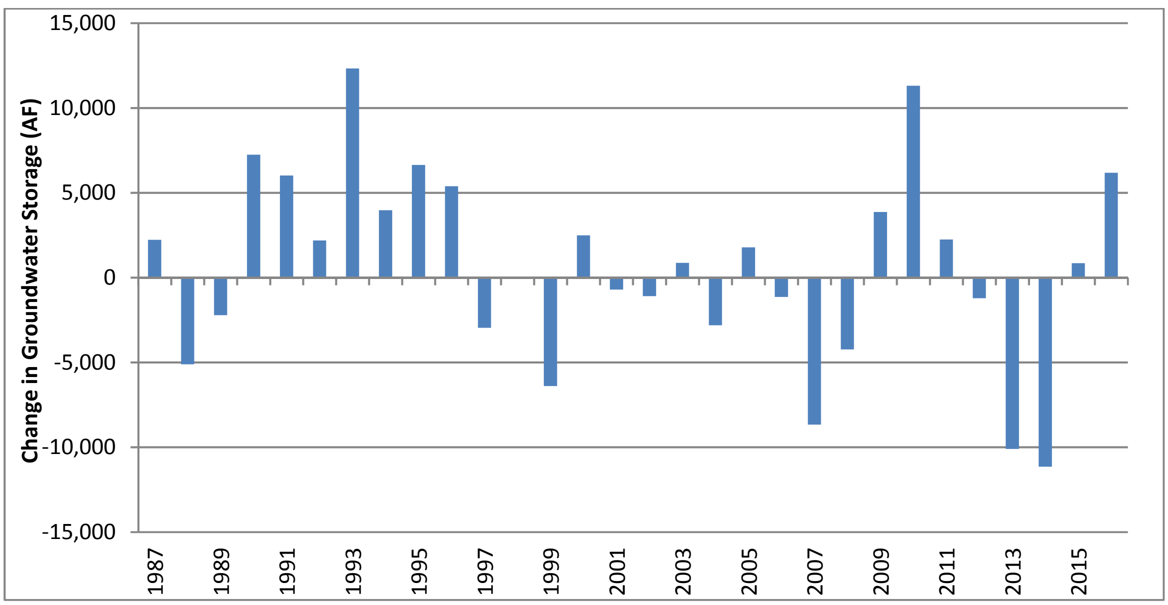
[61] California Department of Water Resources website: http://water.ca.gov/groundwater/sgm/definitions.cfm

4.4.2.3 Groundwater Storage

The District has previously estimated the operational storage capacity of the Llagas Subbasin to range between 152,000 and 165,000 AF.[62] The operational storage capacity is less than total storage capacity as it accounts for the avoidance of adverse impacts. The estimate is based on the product of specific yield,[63] area, and the elevation difference between high and low groundwater surfaces. Groundwater level data for 1982-1983 was used for the high surface and 1976-1977 for low conditions. While the District developed a groundwater flow model for the Llagas Subbasin since operational storage capacity was last estimated, pumping and recharge data is not available before 1987 when the District assumed groundwater management of the Llagas Subbasin. The District will evaluate the estimate of operational storage capacity to determine if it needs to be refined.

Figure 4-13 shows the estimated annual change in groundwater storage in Llagas Subbasin from 1987 (the year the District assumed management of the subbasin) to present.

Figure 4-13. Annual Change in Storage in the Llagas Subbasin (1987-2016)



4.4.2.4 Water Budget

A water budget for the Llagas Subbasin for calendar years 2003 to 2012 is presented in Table 4-6. This budget is based on the District groundwater flow model for the Llagas Subbasin and represents general subbasin inflows and outflows. Recharge is estimated to be 46,000 AF per year, with about half coming from the District's managed recharge of local and imported water, and the other half from natural recharge.

The major outflow is groundwater pumping, which averages 44,000 AFY. The subsurface outflow, which includes flows to the Bolsa Subbasin in San Benito County, is estimated to be about 3,000 AF per year. The average annual change in storage between 2003 and 2012 is approximately zero, indicating inflows and outflows are generally balanced over the ten-year period.

[62] Santa Clara Valley Water District, Operational Storage Capacity of the Coyote and Llagas Groundwater Subbasins, April 2002.
[63] Specific yield essentially represents the amount of water that can be released from a certain volume of aquifer.

Table 4-6. Llagas Subbasin Principal Aquifer Budget (2003-2012)

Water Budget Component	Acre-Feet per Year
Inflow	
Managed Recharge[1]	24,000
Natural Recharge[2]	22,000
Subsurface Inflow[3]	1,000
Total Inflow	47,000
Outflow	
Groundwater Pumping[4]	44,000
Subsurface Outflow[5]	3,000
Total Outflow	47,000
Change in Storage	0

1. Managed recharge represents direct replenishment by the District using local and imported water.
2. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks.
3. Subsurface inflow represents inflow from adjacent aquifer systems, including inflow from the Bolsa Subbasin in San Benito County.
4. Pumping is based on metered pumping volumes, or pumping reported by well owners.
5. Subsurface outflow represents outflow to adjacent aquifer systems, including outflow to the Bolsa Subbasin in San Benito County.

4.5 FUTURE DEMANDS

The District's 2015 Urban Water Management Plan includes a comprehensive assessment of projected future water supplies and demands in Santa Clara County. Estimating future demands allows the District to manage the county's water supply and appropriately plan infrastructure investments.

The following sections describe projected demands in the Santa Clara and Llagas subbasins, based on data used to develop the District's 2015 UWMP. Due to large projected increases in water use by several water retailers, the UWMP projects future water supply shortfalls during multi-year droughts.

The UWMP recognizes that the near-term and potentially long-term water demand may be considerably affected by the recent and unprecedented statewide drought conditions of 2012 to 2016. This event has already affected demand as the public has changed attitudes and as water use restrictions have been put in place. Some of the water use efficiency successes and changed behavior will last into the future. But if the past is a guide, some rebound of water use will likely occur within a few years of removing water use restrictions. This drought and the local and statewide efforts to date may likely lead to new policy or technological enhancements that may reduce future demands in ways that cannot be currently predicted.

Groundwater demands in the Santa Clara Subbasin are projected to increase from 2020 to 2040 as shown in Table 4-7. Compared to average pumping of 103,000 AFY for the period 2003-2012, future projections show a drop of around 5% by 2020, followed by a steady increase.

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Table 4-7. Projected Future Groundwater Demands (AF)

Subbasin/Management Area	2020	2025	2030	2035	2040
Santa Clara Subbasin	**98,000**	**105,000**	**111,000**	**118,000**	**123,000**
Santa Clara Plain	86,000	92,000	97,000	103,000	107,000
Coyote Valley	12,000	13,000	14,000	15,000	16,000
Llagas Subbasin	**47,000**	**49,000**	**52,000**	**53,000**	**53,000**

Projections rounded to nearest 1,000 AF.

Future groundwater demands in the Llagas Subbasin are projected to increase from 2020 to 2035, then level out through 2040 as shown in Table 4-7. Future pumping is projected to increase by around 7% in 2020 relative to the current long-term average pumping of 44,000 AFY. Agricultural and independent (non-retailers) pumping are assumed to remain constant over the UWMP planning horizon.

Projected pumping in Table 4-7 is based primarily on demand projections provided by water retailers prior to April 2016. Several retailers have updated their demand projections since the District's 2015 UWMP analysis was completed. The District is coordinating with water retailers and other interested stakeholders during development of the Water Supply Master Plan to ensure future assumptions about growth and demand are aligned as much as possible. The Water Supply Master Plan will recommend various actions and investments needed to address projected future shortfalls during multi-year droughts. The District is scheduled to complete the Water Supply Master Plan in 2017.

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Chapter 5 – Sustainable Management Criteria

CHAPTER 5 – SUSTAINABLE MANAGEMENT CRITERIA

This chapter presents the District's groundwater sustainability goals, basin management strategies, and outcome measures.

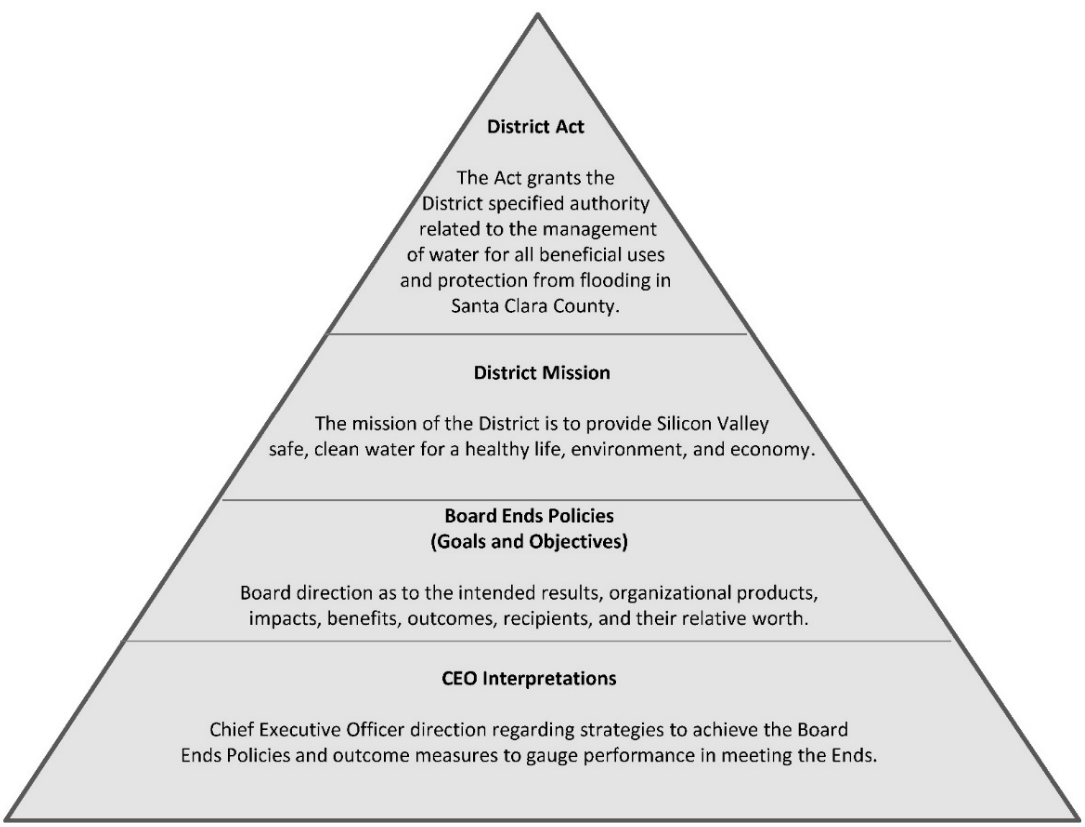
5.1 SUSTAINABLE MANAGEMENT CRITERIA

The District manages the Santa Clara and Llagas subbasins as an integrated component of the overall water supply, and as such, the goals and strategies for groundwater management are based on the existing District Board of Directors Ends Policies listed below.

- Board Water Supply Goal 2.1: Current and future water supply for municipalities, industries, agriculture, and the environment is reliable.
- Board Water Supply Objective 2.1.1: Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion.

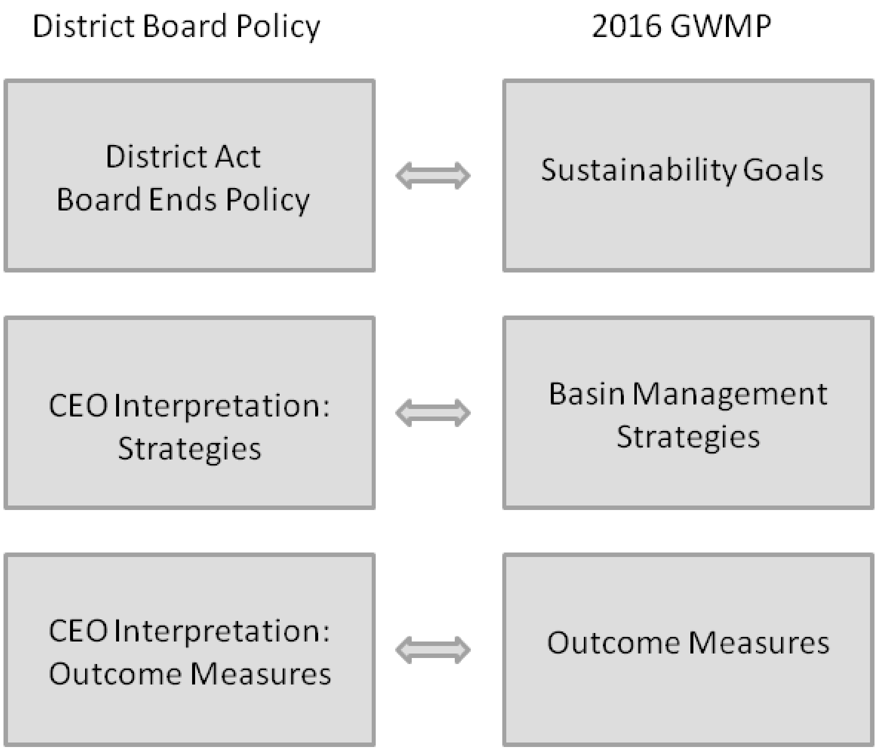
District programs and activities are developed in accordance with the District Act objectives and based on policy guidance from the Board of Directors. The CEO has also developed CEO Interpretations, which include direction, strategies, and outcome measures. Outcome measures are specific, measurable goals to gauge performance toward meeting the Board Ends Policies. The relationship of the District Act, Board policies, and CEO Interpretations is shown below in Figure 5-1 with each level taking direction from the level above.

Figure 5-1. District Policy Framework



The sustainability goals and strategies in this 2016 GMWP are developed within this policy framework and share a parallel structure. The relationship between the District Act, District Policies, the sustainability goals, and District groundwater programs are shown in Figure 5-2. The goals, strategies, and performance measurement are described below.

Figure 5-2. Relation Between District Policy and 2016 GWMP



5.2 SUSTAINABILITY GOALS

Using the District's overall water supply management objectives, the following sustainability goals related to groundwater supply reliability and protection were developed:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

These sustainability goals describe the overall objectives of the District's groundwater management programs. The rationale and meaning of these objectives, as well as their relationship to District policies, are discussed below.

5.2.1 Groundwater Supply Reliability

Goal: Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.

Local groundwater resources are the foundation of the county's water supply, but they need to be augmented by the District's comprehensive water supply management activities in order to reliably meet the needs of county residents, businesses, agriculture and the environment. The District relies on groundwater for a significant portion of the county's water supply, particularly in South County where groundwater provides more than 90% of supply

for all beneficial uses and 100% of the drinking water supply. The District manages groundwater in conjunction with surface water to reliably meet the county's water demands now and in the future.

As described previously, significant subsidence occurred historically in the Santa Clara Plain due to chronic overdraft, but was essentially halted by about 1970 through the District's expanded conjunctive management programs. The District's goal of minimizing land subsidence is combined with the water supply reliability goal since the actions taken to address one also addresses the other. Preventing additional permanent subsidence has been a major driver for the District over its history given the extremely high costs associated with reduced carrying capacity of flood control structures, damage to infrastructure, and salt water intrusion.

5.2.2 Groundwater Quality Protection

Goal: Groundwater is protected from contamination, including salt water intrusion.

While surface water goes through significant treatment processes before being served as drinking water, groundwater from the Santa Clara and Llagas subbasins typically does not require any treatment other than disinfection. Although the District does not serve groundwater directly to consumers, as the local groundwater management agency the District works to ensure that the groundwater used by the residents and businesses of Santa Clara County is of reliably high quality.

In highly urbanized areas such as the Bay Area, there are numerous threats to groundwater quality including urban runoff, industrial chemical spills, illegal dumping, and leaking underground storage tanks. Agricultural and residential use of pesticides and nitrogen-based fertilizers can also impact groundwater quality. As surface water percolates through soil layers, some natural filtration occurs; however, this natural process is not effective for all contaminants.

Groundwater degradation may lead to costly treatment or even make groundwater unusable, resulting in the need to secure additional supplies. Preventing groundwater contamination is more cost effective than cleaning up polluted groundwater, a process that can take many decades depending on the nature and extent of the contamination. Notable contamination sites in the county requiring significant groundwater cleanup include large solvent releases at the IBM and Fairchild sites in south San Jose in the 1980s and the Olin perchlorate release in Morgan Hill, which was discovered in the early 2000s.

Historically, salt water intrusion has been observed in the shallow aquifers of the Santa Clara Subbasin adjacent to San Francisco Bay during periods of higher groundwater pumping and land subsidence. Significant increases in groundwater pumping or sea level rise due to climate change could lead to renewed salt water intrusion.

The goal of the District's groundwater quality protection programs is to ensure that groundwater is a viable water supply for current and future beneficial uses. In addition to the principal, deep drinking water aquifers, the District works to protect the quality of all aquifers. Although not typically used for beneficial purposes, shallow groundwater is also a potential future source for drinking water or other beneficial use.

Section 5 of the District Act authorizes the District to prevent the pollution and contamination of District surface water and groundwater supplies. This sustainability goal is consistent with the District Act and with Board Water Supply Objective 2.1.1.

5.3 BASIN MANAGEMENT STRATEGIES

The basin management strategies are the methods that will be used to meet the sustainability goals. Many of these strategies have overlapping benefits to groundwater resources, acting to improve water supply reliability,

minimize subsidence, and protect groundwater quality. The strategies are listed below and described in detail in this section.

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

Strategy 1: Manage groundwater in conjunction with surface water.

The desired goal of this strategy is to have a sustainable, reliable groundwater supply and minimize the potential for salt water intrusion and land subsidence. The primary mechanisms for implementing this strategy are the District's managed and in-lieu recharge programs. The county relies on local groundwater subbasins to help meet water demands, naturally transmit water over a wide area, and provide critical storage reserves for emergencies such as droughts or other outages. Because groundwater pumping far exceeds what is replenished naturally, the District manages groundwater and surface water in conjunction to ensure the groundwater subbasins remain an important component in meeting current and future water demands.

Maintaining the District's comprehensive managed recharge program using both local and imported waters is critical to sustaining groundwater supplies. This requires maintaining local water rights, water supply sources, and existing recharge facilities. The strategy also relies on developing additional recharge facilities and sources to help support future needs as identified in the District's Water Supply Master Plan. Currently, several of the District reservoirs have restricted storage capacity due to limitations imposed by Division of Safety of Dam (DSOD). Resolving dam safety issues that currently restrict reservoir storage is also an essential component of this strategy.

Just as important as managed recharge, are the availability of SFPUC supplies to the county, the District's treated water deliveries, and water conservation and water recycling programs, which provide in-lieu recharge by reducing groundwater demands. Together these programs help to maintain adequate groundwater storage, keep groundwater levels above subsidence thresholds, and maintain flow gradients. This, in turn, supports groundwater pumping and minimizes risks related to land subsidence and salt water intrusion. The District's managed recharge and in-lieu programs are described in detail in Chapter 6.

Strategy 2: Implement programs to protect and promote groundwater quality.

Groundwater in Santa Clara County is generally of very high quality, with few public water systems requiring treatment beyond disinfection prior to delivery to customers. The District evaluates groundwater quality and potential threats so that changes in groundwater quality can be detected and appropriate action can be taken to protect the quality of groundwater resources. This includes assessing regional conditions and trends, evaluating threats to groundwater quality including emerging contaminants, conducting technical studies such as vulnerability assessments, and implementing strategies to protect groundwater from contaminant sources.

Because the District does not have regulatory or land use authority, this strategy is focused on identifying potential concerns and implementing programs to reduce contaminant loading or consumer exposure. Efforts to coordinate with land use and regulatory agencies are described in Strategy 4 below. Groundwater protection programs are described in detail in Chapter 6.

Strategy 3: Maintain and develop adequate groundwater models and monitoring networks.

Monitoring programs provide critical data to understand groundwater conditions and support operational decisions, including the timing and location of managed recharge. The District has implemented programs to regularly monitor

groundwater levels, groundwater quality (including monitoring near recycled water irrigation sites), recharge water quality, surface water flow, and land subsidence. Local water retailers also collect groundwater quality data for compliance with DDW regulations and monitor groundwater levels. Data from these programs is essential to evaluating current conditions, preventing groundwater overdraft and subsidence, and measuring the effectiveness of basin management programs and activities. These monitoring programs and related monitoring protocols are described in Chapter 7.

The District has also developed models to support operational decisions and long-term planning. These include operational and water supply system models, as well as groundwater flow models. The District has developed calibrated flow models for the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin, which are used to evaluate groundwater storage and levels under various operational and hydrologic conditions. These models are used to support decisions on recharge and other water supply operations, the evaluation of potential projects, and long-term water supply planning. Maintaining calibrated models that can reasonably forecast groundwater conditions is an important part of the District's groundwater management strategy.

Strategy 4: Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

Since the 1950s, land use in the Santa Clara Plain has changed from largely rural and agricultural to a highly developed urban area. The increased amount of land covered by impervious materials has increased surface water runoff and reduced natural recharge. Although not as urbanized as the Santa Clara Plain, the Llagas Subbasin serves the growing cities of Morgan Hill and Gilroy, and significant development has been considered in the Coyote Valley. This strategy calls for working with land use agencies to maximize natural recharge by protecting groundwater recharge areas and supporting the use of low-impact development.

Increased urbanization also increases the risk of contamination, particularly in groundwater recharge areas which are more vulnerable due to the presence of highly permeable sediments. The District coordinates with land use agencies with regard to potentially contaminating land use activities and resource protection. Regulatory agencies play a critical groundwater protection role by establishing water quality objectives and overseeing the cleanup of contaminated sites. The District will continue to work with these agencies and identify opportunities for enhanced cooperation to minimize impacts from existing contamination and prevent additional contamination from occurring. This includes the development of technical studies, participation in policy development, and coordination on proposed development.

5.4 OUTCOME MEASURES

This section describes key performance measures in meeting the following sustainability goals: (1) Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence; and (2) Groundwater is protected from contamination, including salt water intrusion. These outcome measures, described in detail in this chapter, are as follows:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds at the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The basis for these outcome measures and a description of how they will be measured is presented below.

5.4.1 Groundwater Storage

Outcome Measure: Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 AF in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.

Groundwater storage is a critical consideration in water supply reliability and is the county's best protection against drought or facility outage. The end of year groundwater storage is projected to support operational decisions, including the timing and location of reservoir releases and managed recharge, and decisions related to imported water such as short-term water exchanges or out of county banking.

The District's Urban Water Management Plan[64] contains a water shortage contingency plan that uses groundwater storage to indicate potential water shortages and outlines the overall strategy for dealing with water shortages, including contingency actions. The "normal" stage where no contingency action is needed occurs when the projected end of year groundwater storage is above 300,000 AF in the Santa Clara and Llagas subbasins combined.

While the UWMP provides an overall storage target of 300,000 AF in both the Santa Clara and Llagas subbasins, more specificity is needed with regard to the management of individual subbasins and groundwater management areas. Based on groundwater storage observed historically, the end of year storage targets established in this GWMP are 283,000 AF in the Santa Clara Subbasin (278,000 AF in the Santa Clara Plain and 5,000 AF in the Coyote Valley) and 17,000 AF in the Llagas Subbasin.

5.4.2 Groundwater Levels and Land Subsidence

Outcome Measure: Groundwater levels are above subsidence thresholds at the subsidence index wells.

Significant inelastic land subsidence occurred in the Santa Clara Plain through the 1960s due to long-term overdraft. Permanent subsidence was essentially halted by about 1970 through the District's expanded conjunctive use programs, which allowed a substantial recovery in groundwater levels. The avoidance of inelastic land subsidence has been and continues to be a major driver for the District given the extremely high costs associated with damaged infrastructure, reduced carrying capacity of flood control structures, and salt water encroachment into fresh water aquifers.

In 1991, the District evaluated the remaining land subsidence potential so as to avoid additional inelastic subsidence due to groundwater overdraft.[65] Based on the findings of this study, the District has established an acceptable subsidence rate of no more than 0.01 feet per year on average. This rate was presented to and endorsed by the Water Retailer Groundwater Subcommittee following the 1991 study, and the related subsidence thresholds have been used historically to measure performance in meeting Board policy. Monitoring data indicates that the subsidence target has generally been met. Ten index wells throughout the Santa Clara Subbasin were selected as control points for subsidence model calibration and prediction and the tolerable rate of 0.01 feet per year of inelastic subsidence was applied to determine threshold groundwater levels for these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of unacceptable land subsidence.

This outcome measure relies on continued observation of groundwater levels at the subsidence index wells and comparison to subsidence thresholds to ensure groundwater levels are maintained above these thresholds

[64] Santa Clara Valley Water District, Urban Water Management Plan, 2015.

[65] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

(Table 5-1). Since inelastic subsidence is irreversible, it is critical that it is prevented rather than observed. Therefore, to be proactive, the District also performs scenario modeling to project future groundwater conditions so changes in operations or groundwater management can be made to avoid inelastic subsidence before it occurs. It should be noted that a few wells shown in Table 5-1 differ from those in the 1991 study due to well destruction or loss of access. Replacement wells are chosen such that they are in close proximity to and display similar water level patterns as the original well.

Table 5-1. Subsidence Thresholds

Subsidence Index Well Number	State Well ID	Threshold Elevation (feet above mean sea level)	Location
1	08S01W03K013	166	Near Division St./Dell Ave. in Campbell
2	08S01E05N002	-23	Near Jarvis Ave./Gerlach Dr. in South San Jose
3	07S01E02J021	-146	Near Story Rd./Moginess Ave. in East San Jose
4	06S01W24H015	-18	Near Montague Expy/Seely Ave. in Milpitas
5	07S01W22E002	-45	Near San Tomas Expy/Williams Ave. in West San Jose
6	07S01W08D003	-47	Near Kensington Ave./Lochinvar Ave. in Santa Clara
7	06S02W22G005	-26	Near Middlefield Rd./Tyrella Ave. in Mountain View
8	06S02W24C010	-30	Near Hwy 101/Hwy 237 in Sunnyvale
9	07S01W02G024	-35	Near El Camino Real/Benton St. in Santa Clara
10	07S01E16C006	-40	Near Hwy 280/12th St. in downtown San Jose

5.4.3 Water Quality

Outcome Measure: At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.

Water supply reliability depends on maintaining both an adequate supply of water and protecting water quality. While surface water goes through significant treatment before being served as drinking water, groundwater from public water supply wells does not typically require wellhead treatment beyond disinfection before being delivered to consumers. This makes protecting groundwater quality all the more critical. The Santa Clara and Llagas subbasins have good water quality overall, but maintaining that quality is not without its challenges. Threats to groundwater quality come from a variety of sources and include urban, rural, and agricultural activities. Elevated nitrate is widespread throughout the South County, and there are typically a few detections above maximum contaminant levels each year for constituents such as perchlorate and aluminum.

To protect the quality of groundwater for beneficial uses, this outcome measure evaluates the percentage of water supply wells that meet all primary MCLs and South County wells that meet agricultural objectives for irrigation. Since the focus of this outcome measure is on groundwater currently used and most of the groundwater extracted is from deeper aquifers, data from water supply wells in the principal aquifer zone are used for this measure. This outcome measure will be evaluated annually using data collected at water supply wells by the District and water

retailers. Data from dedicated monitoring wells will not be used as it is less representative of water being pumped for beneficial use.

The target percentage for water supply wells meeting primary MCLs is set high (95%) since these are health-based regulatory standards that must be met by public water systems. This measure is not set at 100% for several reasons. Some of the wells monitored by the District are private domestic wells, which are assumed to have less stringent wellhead protection, maintenance, and testing. The water quality at these wells may be more influenced by local land use and conditions near the well as they are typically shallower than public water supply wells and domestic wells are not subject to drinking water standards. Also, DDW does not consider a single detection of a contaminant to be indicative of contamination and would not consider a single detection to be an actual finding without a follow-up detection. Water served to customers may not have had the contaminant present at that concentration since water systems may perform treatment or blending prior to service.

The target percentage for the Coyote Valley and Llagas Subbasin water supply wells meeting Basin Plan agricultural objectives for irrigation is set at 90%. The lower target for the agricultural outcome measure reflects the less serious consequences; not meeting this target does not adversely impact human health but may reduce plant yield. Ideally, the measurement would rely on agricultural wells, however the District has monitoring access to very few of these wells. Agricultural wells are assumed to have similar construction as water supply wells (multiple screened intervals) so water supply wells are used as a proxy. This measure is only applicable to water supply wells in the Coyote Valley and Llagas Subbasin since there is very little remaining agriculture in the Santa Clara Plain. Water quality data will be compared to agricultural objectives for irrigation per the San Francisco Bay Basin Plan for the Coyote Valley and the Central Coast Basin Plan for the Llagas Subbasin.

Outcome Measure: At least 90% of wells in both the shallow and principal zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The timely identification of adverse trends is important so that appropriate action can be taken to protect groundwater resources. This outcome measure will evaluate long-term trends in groundwater quality for nitrate, chloride, and TDS on an annual basis using ten years of data from both water supply and dedicated monitoring wells. This will help the District to better understand how groundwater quality is changing over time and highlight areas that may warrant further study or action to protect the beneficial use of groundwater.

Nitrate trends will be evaluated because nitrate affects the largest number of wells in the county. Common sources of nitrate in groundwater are synthetic fertilizers, septic systems, and animal wastes. Elevated nitrate is common in the Llagas Subbasin and parts of the Coyote Valley due to historic and ongoing sources; however, there are also localized areas with nitrate concerns in the Santa Clara Subbasin. Chloride is used to measure potentially adverse trends related to salt water intrusion, which has occurred historically adjacent to San Francisco Bay. Evaluating long-term trends will help assess the potential for renewed intrusion. TDS is used as an indicator of salt loading and of overall water quality. The salts from applied irrigation water remain in the soil layer, and can eventually be leached into groundwater by rainfall or over-irrigation.

This outcome measure tracks the trend in nitrate, chloride, and TDS concentrations to evaluate potentially adverse conditions. The measure evaluates both the shallow and principal aquifer zone wells since changes in shallow wells might be detectable before changes appear in deeper wells. Trends will be analyzed for all available wells, including both water supply and dedicated monitoring wells. The outcome measure uses a target percentage of 90% to serve as a broad indicator of trends in these constituents, while recognizing that groundwater quality can fluctuate at any given well over time due to hydrology, pumping, or other factors. Also, the mere presence of a statistically significant increasing trend does not necessarily indicate a problem; the magnitude of change also needs to be considered. While the target percentage of 90% will serve as an overall indicator of trends in groundwater quality, the magnitude of the trend will also be evaluated to identify potential areas of concern so that additional action can be taken if necessary to protect groundwater resources.

CHAPTER 6 – BASIN MANAGEMENT PROGRAMS AND ACTIVITIES

District programs to protect and augment water supplies are implemented under powers granted by the District Act,[66] which authorizes the District to provide comprehensive water management for all beneficial uses within Santa Clara County. The District Act authorizes the District to take the following actions to protect and augment water supplies:

- Conserve and manage water for beneficial and useful purposes, including spreading, storing, retaining, and groundwater recharge.
- Protect, save, store, recycle, distribute, transfer, exchange, manage, and conserve water.
- Increase and prevent the waste or diminution of the water supply.
- Obtain, retain, protect, and recycle water for beneficial uses.
- To do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of the lands or inhabitants within the district.

The District has many programs and activities that protect groundwater supplies and quality. Other agencies also implement programs to protect groundwater resources in the county. This chapter describes programs developed to maintain a reliable water supply, prevent inelastic (permanent) land subsidence, and protect groundwater quality, both now and in the future. Monitoring programs are described in Chapter 7.

In addition to the programs described in this chapter, the District monitors emerging policies and regulations, collaborates with key decision makers and stakeholders to effect policy change, cultivates relationships, and works with federal, state, and local government representatives on pending legislation and regulatory standards related to the protection of groundwater resources. The purpose of these activities is to ensure that District interests are communicated and considered in legislative and regulatory processes.

This chapter focuses on operations projects or ongoing basin management activities programs implemented by the District and other agencies. The District also implements capital projects as needed to protect and augment groundwater resources. These projects are described in the District's Capital Improvement Program.[67]

6.1 PROGRAMS TO MAINTAIN A RELIABLE GROUNDWATER SUPPLY

The groundwater subbasins are a critical component of the overall water supply of the District. The District manages water resources, including groundwater and imported water, and wholesales treated water to water retailers in Santa Clara County to achieve overall water supply reliability. By maintaining groundwater levels and sufficient storage, these programs prevent undesirable results including long-term groundwater overdraft, inelastic land subsidence, and salt water intrusion. Related programs and activities are described in detail below.

6.1.1 Managed Recharge

To offset groundwater withdrawals and ensure the long-term sustainability of groundwater resources, the District replenishes the groundwater subbasins with local and imported surface waters in District recharge facilities. This section focuses on managed recharge operations; however it should be noted that the managed recharge program depends upon many other District programs, including programs related to dam maintenance, the administration and management of imported water contracts, local water rights management, groundwater analysis, and

[66] Santa Clara Valley Water District Act, Water Code Appendix Chapter 60.

[67] Santa Clara Valley Water District, 5-Year Capital Improvement Program, 2017-2021.

maintenance of the raw water conveyance system.

By releasing locally-conserved and imported water from local reservoirs or the District's raw water distribution system, the District significantly increases groundwater recharge. On average, the District's managed recharge program replenishes twice the amount of water replenished naturally. District recharge facilities are designed for rapid infiltration based on their permeability and hydraulic characteristics. Through the District's managed recharge operations, an average of 98,000 AF was recharged annually between 2003 and 2012. This water came from a variety of sources, including watershed stormwater runoff captured in the county's 10 local reservoirs and water imported from both the State Water and Central Valley Projects. Managed recharge was scaled back during the recent drought due to limited surface water availability. In 2015, managed recharge was around 54,000 AF. During periods of limited surface water availability, priority for managed recharge is typically given to highly groundwater-dependent areas such as the Coyote Valley and Llagas Subbasin.

Recharge facilities are closely monitored using a computerized control system and field observation. The raw water control system provides for remote operation of water distribution facilities and real-time system performance data. Operations technicians perform daily inspections of recharge facilities and record flows and water levels. Operations include daily monitoring of forecasts, inflows, and storage levels to plan releases for water supply operations, dam safety and bank stability, habitat management, and flood potential reduction.

6.1.1.1 Reservoirs and Diversions

The District constructed 10 reservoirs and five stream diversions to enable appropriation of water supplies under the District's water rights. The primary function of the District's surface water reservoirs is to store local and imported water for groundwater recharge. Dams are operated under certificates of approval from the State Division of Safety of Dams and reservoirs and diversions are operated in accordance with the California Fish and Game Code. Total storage capacity of the District's reservoirs is 169,000 acre-feet. The District is currently assessing the seismic stability of its reservoirs, and several reservoirs are currently subject to operating restrictions that reduce reservoir storage capacity until upgrades are implemented. These operating restrictions may impact groundwater recharge for facilities that depend on local water supplies since the amount of local water that can be captured is reduced.

Most of the stored water released from the reservoirs is delivered to streams below the dams. As the water flows downstream, some of it percolates through the streambed and recharges the groundwater subbasins. Some water may be diverted downstream for recharge in off-stream recharge facilities. The District also operates and maintains several systems that divert water to recharge facilities and enhance recharge. Additional detail on District recharge facilities is in Appendix C.

6.1.1.2 In-Stream Managed Recharge

The District conducts in-stream managed recharge operations in more than 90 miles of stream channel.[68] About two-thirds of the District's managed recharge occurs through in-stream recharge facilities, with over 60,000 AF recharged from District releases into creeks in most years. In 2015, a drought year, in-stream managed recharge was reduced to around 27,000 AF. In addition to ongoing planning, monitoring, and inspection of facilities, the District also coordinates operations for flashboard dams and spreader dams with the California Department of Fish and Wildlife (DFW) under related agreements.

District recharge operations along streams have been modified in recent years to reflect environmental concerns, including the protection of aquatic habitats. In 1996, the Guadalupe Coyote Resources Conservation District (GCRCD) filed a complaint with the State Water Board alleging that District water supply operations impact fish and aquatic

[68] Santa Clara Valley Water District, FY 2017-2021 Water Utility Enterprise Operations Plan.

habitat in Coyote and Stevens Creeks, and the Guadalupe River tributaries.

In 2003, settlement negotiations with GCRCD as well as the National Marine Fisheries Service (NMFS), US Fish and Wildlife Service (FWS), DFW, and other interested non-governmental organizations resulted in the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) settlement agreement. The agreement set forth a pathway to resolve the water rights complaint through changes to District reservoir reoperations, scientific studies, and restoration measures once the complaint is withdrawn. Although the District is not yet required to implement FAHCE measures, it has moved forward with restoration measures for the protection of fish and wildlife resources consistent with Board policies. In conjunction with flood protection efforts, the District has removed 22 fish passage barriers, laddered and screened water diversions, and collected data to provide a foundation to support fish and aquatic habitat restoration to fulfill elements of the FAHCE Settlement Agreement.

In May 2015, the District submitted fifteen Petitions for Change to the State Water Board to address the water rights in the FAHCE settlement agreement. The proposed change in the purpose of use from domestic and irrigation to municipal more accurately reflects current and future use of local water for groundwater recharge and conjunctive use.

6.1.1.3 Off-Stream Managed Recharge

The District conducts off-stream managed recharge operations in over 70 recharge ponds that range in size from less than 1 acre to more than 20 acres. Recharge through off-stream ponds accounts for about a third of the District's managed recharge, with over 30,000 AF of water delivered to recharge ponds in most years. In 2015, off-stream managed recharge was around 27,000 AF due to limited surface water supplies. Ongoing maintenance of off-stream ponds is conducted by removing accumulated fine sediments to maintain optimal recharge rates.

6.1.1.4 Injection Well Pilot

The District's San Tomas Injection Well is a full-scale pilot direct injection facility, with a capacity of 750 AF per year. This facility is able to receive treated water from the District's Rinconada Water Treatment Plant via the District's Campbell Distributary. It provides an additional element that improves the flexibility of the District's conjunctive management program. The injection well is not currently in operation.

6.1.1.5 Treated Groundwater Reinjection Program

Over the years, hundreds of thousands of acre-feet of groundwater have been extracted in Santa Clara County to control or mitigate contamination plumes caused by spills or leaks of hazardous materials. To facilitate the cleanup of contamination sites, protect groundwater resources, and minimize the discharge of local waters to storm drains or sanitary sewers, the District adopted Resolution 94-84 to encourage the reuse or recharge of treated groundwater from groundwater contamination cleanup projects. This program includes the review of applications against specific criteria to ensure that groundwater quality is protected and provides a financial incentive for qualifying projects. The program criteria are stringent to ensure compliance with the District Act; most parties extracting groundwater for environmental remediation do not meet the criteria.

6.1.1.6 Indirect Potable Reuse

The District's 2012 Water Supply Master Plan recommended developing 20,000 acre-feet per year of advanced treated recycled water for indirect potable reuse by 2030. The District is considering expanding the potable reuse program identified in the Water Supply Master Plan as part of an Expedited Purified Water Program, with potential potable reuse capacity up to 45,000 AFY. The District anticipates using fully advanced treated recycled water (purified water) for managed recharge, similar to the highly successful Groundwater Replenishment System

operated by the Orange County Water District. However, additional feasibility studies, stakeholder and community input, technology testing, and research are necessary prior to beginning project-specific planning work.

6.1.2 In-Lieu Recharge

The District's in-lieu recharge programs play a critical role in maintaining groundwater basin storage and preventing undesirable results by meeting water demand that would otherwise be met by groundwater pumping.

6.1.2.1 Treated Water Operations

The District operates three drinking water treatment plants, which operate 24 hours a day, 7 days a week and provide in-lieu recharge by reducing groundwater demands. The Rinconada Water Treatment Plant, which was constructed in 1967, has a maximum flow rate of 80 million gallons per day (MGD). The Penitencia Water Treatment Plant was constructed in 1974 and has a maximum flow rate of 40 MGD. The Santa Teresa Water Treatment Plant can process 100 MGD and has been on line since 1989. The long-term average treated water delivery is 119,000 AF per year for the period 2003 to 2012. The annual treated water delivery ranges from a maximum of 136,000 AF to a minimum of 76,000 AF for the same period. In 2015, a drought year, treated water delivery was about 94,500 AF.[69]

6.1.2.2 Water Banking and Supplemental Water Supplies

The District also stores imported water used for in-lieu and managed recharge in the Semitropic Groundwater Bank in Kern County for withdrawal when needed. This involves conveyance of the District's SWP and/or CVP water to the bank, which operates a conjunctive use program. Storage in the bank occurs when water is physically delivered to recharge ponds, or when surface water deliveries are used by the banking partner in-lieu of groundwater pumping. Return of stored water is accomplished when the banking partner uses groundwater in place of surface supplies, or physically pumps groundwater into the surface conveyance system for use by DWR for the SWP. The District is then delivered imported water from the Delta that would have otherwise been delivered to the banking partner or to other SWP contractors.

If water supplies are insufficient to meet needs, the District may also purchase transfer water or participate in exchanges to supplement supplies; both transfer and exchange supplies are conveyed to Santa Clara County from the Delta. During the recent drought, both Semitropic Bank withdrawals and the acquisition of supplemental imported water supplies helped to ensure groundwater sustainability. Between 2013 and 2015, withdrawals from the Semitropic bank totaled approximately 126,000 AF.[70]

6.1.2.3 Water Conservation

Per the Board adopted 2012 Water Supply Master Plan, the District's long-term water savings goal is 98,800 acre-feet per year by 2030. To achieve these aggressive long-term goals and the additional Water Conservation Act of 2009 requirements, the District and most major retail water providers partner in implementation of nearly 20 different ongoing water conservation programs that use a mix of incentives and rebates, free device installation, home visits, site surveys, and educational outreach to reduce water consumption in homes, businesses and agriculture. Recent program expansion includes a new gray water system rebate program and increased rebates for turf removal. These programs are designed to achieve sustainable, long-term water savings and are implemented regardless of water supply conditions.

These programs help the District to meet long-term water supply reliability goals as well as short-term demands

[69] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.

[70] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.

placed on the water supply system during critical dry periods and/or other shortages. They reduce flows to Bay Area wastewater treatment plants, avoiding or deferring facility expansions while protecting the Bay's salt marsh habitat. Water conservation saves energy, reduces greenhouse gas emissions, and reduces the need for short-term water use reduction by water retailers. The District's water conservation program saved an estimated 64,000 AF of water in 2015.

6.1.2.4 Water Recycling

Recycled water is a locally-controlled, drought-resistant source of supply used for non-potable uses such as landscape irrigation and industrial cooling. The District partners with the four recycled water producers in the county to expand recycled water use. Approximately 21, 000 AF of recycled water was used in 2015. About 30,000 acre-feet of year 2035 demands are projected to be met with non-potable recycled water. The District's Silicon Valley Advanced Water Purification Center, which uses microfiltration, reverse osmosis, and ultraviolet disinfection to produce up to 8 million gallons of purified recycled water a day, went on-line in 2014. Water from this facility is currently blended into existing recycled water provided by South Bay Water Recycling to improve overall recycled water quality for irrigation and industrial purposes. This facility also allows demonstration of advanced treatment technologies, and sets the stage for potential potable reuse.

6.1.3 Protection of Natural Recharge

The District's managed recharge program augments natural recharge since natural replenishment is insufficient to meet groundwater demands. However, protecting natural recharge capacity is also important. Natural recharge is defined here as any type of recharge not controlled by the District, including: rainfall, subsurface seepage from surrounding hills, net irrigation return flows, net leakage from water distribution systems, storm drains, sewer lines, and septic systems, and net seepage into the groundwater basin. Natural recharge to deep drinking water aquifers is about 55,000 AF per year on average based on estimates from 2003 to 2012. In 2015, a drought year, natural recharge was estimated to be 39,000 AF.[71]

The District Act limits agricultural groundwater production charges to no more than 25% of non-agricultural charges, and Board policy further limits it to no more than 10% in order to preserve open space. The preservation of open space supports agriculture and natural recharge capacity. The District uses non-rate revenue (e.g., 1 percent ad valorem property tax revenue) to offset related lost agricultural revenue for each customer class.

District staff reviews land use plans for local cities and the county, encouraging the preservation of natural infiltration and reduction of impervious surfaces in the areas that contribute groundwater recharge to the principal aquifers.

6.1.4 Groundwater Production Management

The subbasins in Santa Clara County are not adjudicated and the District has not historically controlled the operation of groundwater wells or the amount of groundwater that wells can produce. The groundwater recharge program, treated water sales, recycled water partnerships and aggressive water conservation programs all offset demand on groundwater resources. District tools to influence groundwater production are discussed below.

6.1.4.1 Groundwater Production Measurement

The amount of groundwater pumped from the groundwater subbasins is recorded in accordance with the District Act, which requires owners to register all wells within the District's groundwater management zones and to file

[71] Santa Clara Valley Water District, FY 2016-17 Protection and Augmentation of Water Supplies.

production statements with the District on either an annual, semi-annual or monthly basis depending on the amount of water produced.

By District Board Resolution, meters are only installed at those sites determined to be economically feasible per approved criteria or as required to facilitate the complete and accurate collection of groundwater production revenue. In the Santa Clara Plain, meters are required for facilities producing more than 4 AF of agricultural water or more than 1 AF of non-agricultural water annually. Within the Coyote Valley or Llagas Subbasin, meters are required for facilities producing more than 20 AF of agricultural water or more than 2 AF of non-agricultural water.[72]

Metered wells extract the vast majority of the groundwater used, as shown in Table 6-1 below. Where meters are not used, crop factors are used to determine agricultural water use and average values are used to estimate domestic use.

Table 6-1. District Well Metering Summary (FY 2016)

Groundwater Charge Zone[1]	Number of Metered Wells	Metered Well Production (AF)	Number of Non-Metered Wells	Non-Metered Well Production (AF)
W2	938	58,000	409	200
W5	1,253	35,800	2,708	2,100
Total	**2,191**	**93,800**	**3,117**	**2,300**

1. Groundwater charge zone W2 largely coincides with the Santa Clara Plain, while charge zone W-5 is largely coincident with the Coyote Valley and Llagas Subbasin.
2. Production values are rounded to the nearest 100 AF.

The District also tracks surface water, treated water and recycled water production within the county, and charges users volumetric rates. Water meter testing and maintenance are performed on a regular basis to ensure meters are performing accurately. When problems are discovered, meters are repaired or replaced. Meters are also replaced on a regular basis for testing and rebuilding.

6.1.4.2 Retailer Coordination on Source Shifts and Shortage Response

An essential component of water supply reliability is the cooperation between the District and the water retailers, particularly in the implementation of programs that offset groundwater pumping such as treated water use and water use efficiency. This cooperation has been critical during times of shortage per the examples below.

In 2014, the Board asked retail water agencies, local municipalities and the County of Santa Clara to implement mandatory measures as needed to achieve a 20 percent water use reduction compared to 2013. In the Santa Clara Plain, increased reliance on groundwater reserves caused water levels to approach or temporarily fall below subsidence thresholds at several index wells. The District worked with several retailers to reduce pumping in key areas, which resulted in improved conditions.

Due to the continued extreme drought, in March 2015 the Board increased the water use reduction target to 30% compared to 2013 use and asked that outdoor watering be limited to no more than two days per week. Nearly all water retailers supported the District's water use reduction target, which was higher than their state-mandated targets in many cases. Coordinated community outreach, such as consistent messaging on outdoor watering, lead to an impressive 27% countywide savings in potable water use compared to 2013. Retailer efforts to use treated

[72] Santa Clara Valley Water District, Board of Directors Resolution 91-53.

surface water and reduce pumping in certain areas were also instrumental in groundwater level recovery and minimizing the risk of resumed land subsidence.

6.1.4.3 Groundwater Zones and Groundwater Charges

The District has the authority to establish a zone or zones within which it can levy charges for all groundwater-producing facilities. The purpose of these charges is to fund District activities that protect and augment the water supplies for users within the zones. Creation or modification of charge zones can allow different levels of service within the District's service area, with water users in each zone paying appropriately for the services received. Per the District Act, groundwater charges can be used to pay for costs associated with for the following activities, as well as the principal or interest related to these costs:

- Constructing, maintaining and operating facilities to import water,
- Purchasing water for importation, and
- Constructing, maintaining and operating facilities to conserve or distribute water, including facilities for groundwater recharge, surface distribution, and the purification and treatment of water.

6.1.4.4 Pricing Policies

In creating zones and setting water rates, the District utilizes several concepts as presented in Resolution 99-21, including water pooling and water resource management strategies. Under the District's pooling approach, water is considered a single commodity irrespective of the water's source or costs since all users benefit from the availability of multiple sources of water. The costs of the treated water facilities are pooled with all other costs within the zone of benefit, and recouped primarily through the basic user charge assessed to all water pumped from the groundwater subbasins or provided by District treated water deliveries. The treated water surcharge, paid by treated water users in addition to the basic user charge, is set by the District to influence its retailers in the choice between treated water purchases and groundwater extraction. For example, the District may offer treated water above contract delivery amounts at a discount to encourage retailers to take more treated water rather than pump groundwater. This approach allows the greatest flexibility in water resources management for the overall benefit of all water users in the county, including those that do not receive treated water.

6.1.5 Water Accounting

As described in Section 5.1.1, the District uses local and imported surface water to conduct an active managed recharge program. Many other District programs are needed to support managed recharge, including those related to dam maintenance, the administration and management of imported water contracts, local water rights management, and maintenance of the raw water conveyance system.

To reconcile all measured imported water, reservoir inflows and releases, and changes in surface water storage, a periodic water balance is performed. The results of this balance become the final accounting for distribution and facility processing. The data is used for water rights reporting, accounting for usage of federal water, for facility performance measurement purposes, and for the groundwater subbasin water budget, which is integral to the District's annual PAWS Report. This report establishes the recommended water rates for the next year based on anticipated costs to meet the projected water need.

6.1.6 Groundwater Level and Storage Assessment

District staff evaluates current groundwater levels and storage, and projects future groundwater supply conditions under various water supply scenarios. This analysis supports the District's conjunctive management programs,

water supply operations, and water supply planning efforts. Specific activities include the use and maintenance of groundwater models as well as groundwater level and subsidence databases.

District programs that monitor, track, and evaluate rainfall, surface flows, recharge, and reservoir operations allow the preparation of a detailed surface water balance, which provides data for groundwater models, including stream stage and flow data, managed recharge estimates, and rainfall data. Along with groundwater pumping data, these data allow the District to project groundwater elevations and storage under different operations scenarios.

6.1.6.1 Operations Planning to Meet Near-Term Needs

The District conducts ongoing operational planning to meet demands, protect groundwater reserves, and ensure adequate carryover supplies. Each fall, the District initiates the annual operations planning process. Imported and local supplies are estimated and operations scenarios are developed for the following calendar year, using different hydrologic projections. During the process, imported water deliveries, out-of-county water bank withdrawals or deposits, managed recharge operations, and local water releases to streams and the Bay are projected. Typically by late spring, there is more certainty with regard to hydrologic conditions, and therefore imported water deliveries, reservoir inflows, and local demands. If it appears that groundwater reserves will be drawn down below operational targets, then managed recharge operations may be increased where needed or treated water deliveries may be encouraged to offset groundwater pumping. During droughts, the District also works with water retailers to set demand reduction targets and increase conservation promotions to help protect the groundwater subbasins from overdraft. As the water year progresses and more information becomes available, the operations plans are revised accordingly to optimize local water supply reliability.

6.1.6.2 Contingency Planning

The District's UWMP[73] includes water shortage contingency planning that recognizes groundwater carryover storage as a critical consideration in water supply reliability. An important component of meaningful shortage response is the ability to recognize a pending shortage before it occurs, early enough so that multiple options remain available and before supplies that may be crucial later have been depleted.

Given the operational priorities of the District, projected end of the year groundwater carryover storage serves as the best single indicator of possible impending water shortages. The UWMP proposes guidelines for shortage response, based on groundwater storage. If the projected end of year total groundwater storage is anticipated to drop below 300,000 AF, then shortage response is called for, such as short-term water demand reduction measures. These short-term water demand reduction measures are in addition to ongoing water conservation programs. The focus of the UWMP is not to define operating targets, but rather to identify at what point demand cutbacks or other response measures may be needed. Chapter 5 of this GWMP includes a breakdown of the 300,000 AF storage target by groundwater management area.

6.1.6.3 Planning to Meet Future Needs

The District's water supply plans, the UWMP and the Water Supply Master Plan, evaluate water supply reliability under future scenarios. Every five years, urban water suppliers must prepare an UWMP assessing their water demands, supplies, and potential shortfalls over the next 20 years. The 2015 UWMPs show a continued reliance on groundwater in the future, with the Cities of Morgan Hill and Gilroy projecting significant increases in groundwater use.[74]

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[73] Santa Clara Valley Water District, Urban Water Management Plan, 2015.

[74] Per individual 2015 Urban Water Management Plans for water retailers in Santa Clara County.

The District has increased its efforts to coordinate the water supply projections of its retailers, trying to reconcile the individual projections into a combined water supply future that meets the District's countywide water reliability goals. Water retailers deliver over 85% of the total water used in the county and nearly 95% of the water used in the Santa Clara Plain in northern Santa Clara County. The District's UWMP evaluates whether the projected groundwater use can be sustained over a 25-year planning horizon without risking depletion of groundwater reserves or failing to meet water supply reliability targets. The UWMP (and Water Supply Master Plan described below) use over 80 years of measured or correlated local hydrologic data and are supported by information in the GWMP. The District's UWMP highlights the importance of groundwater reserves, which are critical to meet demands in dry years. Multiple dry years pose the greatest challenge to the District's water supply as storage reserves become depleted.

The purpose of the District's Water Supply Master Plan is to identify and plan the new water supply projects and programs that will be needed to ensure future water supply reliability and groundwater sustainability over a 25-year planning horizon. Preparing the Water Supply Master Plan includes developing objectives based on Board policy; performing a baseline system analysis to determine water supply and infrastructure needs; developing a recommended portfolio of projects and programs to meet those needs; conducting appropriate environmental analysis; engaging water retailers and interested stakeholders in plan development; and preparing a schedule and budget for implementing the recommended portfolio. The Water Supply Master Plan will be updated at least every five years to reflect current conditions.

District staff also coordinates with land use agencies to review certain Environmental Impact Reports, land use proposals, and Water Supply Assessments required for development decisions that meet certain thresholds.[75] The District has been working closely with retailers and cities to address these water supply assessments and other water supply issues.

Projections of future groundwater levels and storage are also performed to support other District planning efforts, including the evaluation of the feasibility of indirect potable reuse and wetland projects.

6.1.7 Asset Management

Maintaining the integrity of the District's existing infrastructure is essential for water supply reliability. This includes maintaining recharge facilities and all District facilities, such as reservoirs, treatment plants, and conveyance and distribution infrastructure. The District maintains a rigorous asset management program to optimize asset renewal strategies and minimize the total cost of owning assets while providing expected service levels and operating at an acceptable level of risk. The program seeks to reduce unplanned infrastructure failure and service disruptions and improve reliability of water supply infrastructure. The program helps to optimize asset lifecycle costs, enable accurate financial planning to sustainably deliver services, and capture and transfer asset-specific knowledge.

6.2 PROGRAMS TO PROTECT GROUNDWATER QUALITY

This section describes activities by the District and other entities that address groundwater quality protection in Santa Clara County. In addition, the District monitors emerging policy and regulatory trends; collaborates with key decision makers and stakeholders to affect policy change; and works with federal, state, and local government representatives on pending legislation or regulatory standards related to the protection of groundwater quality. The purpose of these activities is to ensure that District interests are communicated and considered in legislative and regulatory processes.

[75] California Water Code Section 10610.

6.2.1 Well Ordinance Program

The District Act authorizes the District to prevent the contamination, pollution, or otherwise rendering unfit for beneficial use the surface or subsurface water used or useful in the county.[76] As part of its efforts in exercising this authority, the District developed a well ordinance to protect groundwater resources from contamination. The objective of the Well Ordinance Program is to ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so that they will not allow the vertical transport of waters of poor quality into deeper aquifers used for drinking water. Abandoned and unused wells are required to be sealed in accordance with the District Well Ordinance.[77] The District is authorized to take civil action to abate a public nuisance caused by wells creating a water contamination hazard.

Each year, the District permits and inspects approximately 1,800 exploratory borings, well destructions, and water supply and monitoring well installations under the Well Ordinance Program.[78] Through this program, the District:

- Develops standards for the proper construction, maintenance, and destruction of wells and other deep excavations,
- Informs the public, including contractors, consultants and other government agencies about the Well Ordinance and the well standards,
- Verifies that wells are properly constructed, maintained, and destroyed using a permitting and inspection mechanism,
- Takes enforcement action against violators of the Well Ordinance, and
- Maintains a database and well mapping system to document information about well permitting, well construction and destruction details, a well's location, and well status.

6.2.2 Domestic Well Testing Program

Although public water supply systems are required to regularly test their wells for compliance with DDW regulations, no such regulation exists for private domestic wells. Elevated nitrate is an ongoing groundwater protection challenge due to historic and ongoing sources including fertilizers, septic systems, and animal waste. To better understand the occurrence of nitrate and to help well owners better understand their water quality, the District has implemented a free domestic well testing program for private well owners within the District's groundwater charge zones.

In 1998, the District sampled over 600 private wells to obtain data on nitrate contamination and found that over half of the wells tested provided water that exceeded the DDW Maximum Contaminant Level of 10 milligrams per liter[79] of nitrate as nitrogen. In 2011, the District started the free domestic well testing program in the southern part of the county, which was subsequently expanded to the northern part of the county in 2012. Over 1,300 private well tests have been conducted by the District under this program, which also includes other basic water quality parameters like electrical conductivity, hardness, and bacteria. The program benefits the District by providing more localized information on nitrate and other parameters to supplement regional groundwater monitoring data.

[76] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60, Section 5(5).
[77] Santa Clara Valley Water District Ordinance 90-1.
[78] Santa Clara Valley Water District, FY 2017-2021 Water Utility Enterprise Operations Plan.
[79] Santa Clara Valley Water District, Private Well Water Testing Nitrate Data Report, 1998.

6.2.3 Salt and Nutrient Management

Nitrate is the most significant non-point source contaminant in Santa Clara County due to historic and ongoing sources, including synthetic fertilizer and septic systems. Since the 1990s, the District has implemented nitrate management activities in the Coyote Valley and Llagas Subbasins to ensure the long-term viability of groundwater as a healthful water supply. The goal of these efforts is to reduce the public's exposure to high nitrate concentrations, reduce further loading of nitrate, and monitor the occurrence of nitrate. The District's recharge operations serve to dilute existing nitrate concentrations and focused outreach materials and workshops related to rural land use and groundwater protection also support the District's nitrate management objectives. District programs for conservation in the agricultural sector augment the salt and nutrient management efforts since improved irrigation efficiency may reduce the transport of these constituents to groundwater. Major District efforts related to salt and nutrient management are described below.

6.2.3.1 Salt and Nutrient Management Plans

In 2009, the State Water Board adopted a policy for water quality control for recycled water.[80] A major component of this policy is the requirement for regional Salt and Nutrient Management Plans (SNMPs) as "the appropriate way to address salt and nutrient issues." The SNMPs address salt and nutrient loading to groundwater subbasins that may arise from use of recycled water, imported water, agricultural activity, and other sources, and evaluate the overall salt balance in the groundwater subbasins.

The District worked with local stakeholders to develop two SNMPs, one for the Santa Clara Subbasin (in coordination with the San Francisco Bay Water Board)[81] and one for the Llagas Subbasin (in coordination with the Central Coast Water Board).[82] The SNMPs determine whether salt and nutrient loading to the groundwater subbasins from all sources will cause a net increase in salt and nutrient concentrations in groundwater over the 25-year period ending in 2035. The SNMPs provide the framework for confirming that the groundwater subbasins will be protected from water quality degradation from salt and nutrient loading from all sources, including recycled water projects. The analysis prepared to complete the SNMPs facilitates evaluation of potential impacts or benefits from specific recycled water project proposals.

Projected groundwater concentrations of salts and nutrients (total dissolved solids and nitrate) in groundwater remain within water quality thresholds established in the Water Board Basin Plans for the Santa Clara and Llagas subbasins. Nitrate is projected to decrease in both subbasins, while salt is projected to increase in the Santa Clara Plain area of the Santa Clara Subbasin and decrease in the Coyote Valley area. Salt concentrations are projected to remain relatively unchanged in the Llagas Subbasin. Use of recycled water for irrigation introduces only a minor portion of total salt loading and is supported by the anti-degradation analysis in the SNMPs.

6.2.3.2 Recycled Water Irrigation Evaluation

Recycled water generally has a higher concentration of salts, nutrients, disinfection byproducts, and emerging contaminants than groundwater or treated water, and these contaminants may be introduced to groundwater through landscape irrigation. Recycled water is currently used only for non-potable uses like landscape irrigation, agriculture, and industry. Recycled water undergoes tertiary treatment, except for the South Bay Water Recycling (SBWR) system as described below. With the exception of the Evergreen and Edenvale areas of San Jose and portions of the Llagas Subbasin in Gilroy, all current use of recycled water is limited to the confined areas, where

[80] State Water Board Resolution 2009-0011.
[81] Santa Clara Valley Water District, Revised Final Salt and Nutrient Management Plan: Santa Clara Subbasin, 2016.
[82] Todd Groundwater for Santa Clara Valley Water District, Final Salt and Nutrient Management Plan: Llagas Subbasin, 2014.

significant clays and silts offer a measure of natural protection to deeper drinking water aquifers.

Several groundwater monitoring efforts and studies provide data to help assess potential changes to groundwater quality resulting from the irrigation of recycled water. The District evaluates groundwater monitoring data collected by SBWR, which indicates increasing trends for several inorganic constituents, including chloride and boron, following recycled water application.[83]

In August 2011, the District completed the Recycled Water Irrigation and Groundwater Study[84] to evaluate the potential effects of recycled water used for irrigation on groundwater quality in the Santa Clara Plain and Llagas Subbasin and to identify best management practices to protect groundwater. The study included laboratory testing of soils irrigated with recycled water and an 18-month field study at a site using recycled water for irrigation in the Santa Clara Plain. The study found no significant change in groundwater quality for most constituents monitored. However, some changes were noted, including the presence of a few constituents not previously found in shallow groundwater at the site. A common by-product of the water disinfection process, N-Nitrosodimethylamine (NDMA), was detected in groundwater 30 feet below the surface at trace levels of 3 to 4 parts per trillion (ppt) during the study. Subsequent sampling has found levels of up to 18 ppt, and low-level detections of perfluorinated compounds and other emerging contaminants have been observed in shallow groundwater near other recycled water irrigation sites in the county. The study findings suggest that best management practices and/or changes in recycled water treatment may be warranted when irrigating with recycled water over sensitive parts of the Santa Clara Plain or Llagas Subbasin.

In 2014, the District completed construction of the Silicon Valley Advanced Water Purification Center (SVAWPC). The advanced treated water from the SVAWPC is blended with tertiary treated water from the Santa Clara/San Jose Water Pollution Control Plant (WPCP) and distributed to SBWR recycled water customers. The District continues to monitor groundwater for recycled water impacts and is evaluating whether improvements to shallow groundwater are observed because of blending operations.

As the shallow and unconfined Coyote Valley is highly vulnerable to contamination, the District has determined that all recycled water applied in that area must be advanced treated to avoid groundwater quality impacts. This determination was made during District review of the Coyote Valley Specific Plan, a large proposed development in the Coyote Valley that has since been postponed indefinitely.

6.2.4 Nitrate Treatment System Rebate Program

In November 2012, Santa Clara County voters passed Measure B - the Safe, Clean Water and Natural Flood Protection Program. This 15-year program includes projects to address five priorities, including Priority A: Ensure a safe, reliable water supply. As part of Priority A, the District is offering rebates for nitrate treatment systems to improve water quality and safety for private well users not served by public water systems.

Based on the data collected from domestic well testing program, it is estimated that approximately 1/3 of the domestic wells in the southern portion of the county have nitrate levels above the MCL (in the north this number is less than 10%). To help reduce exposure to elevated nitrate, the water district is offering rebates of up to $500 to private well users that purchase and install nitrate treatment systems. Since program inception, the District has awarded over $3,400 in rebates to eligible well owners. The District continues to perform outreach to potentially affected residents in the county.

[83] Santa Clara Valley Water District, City of San Jose South Bay Water Recycling Groundwater Data Evaluation, May 2008.
[84] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

6.2.5 Vulnerability Assessment

Numerous groundwater vulnerability assessments for groundwater and wells have been conducted in the Santa Clara and Llagas subbasins as described below.

6.2.5.1 Groundwater Vulnerability Studies

In 1985, the San Francisco Bay Water Board completed a vulnerability study,[85] which rated 105 hazardous materials release sites in terms of groundwater pollution potential based on the distance to wells and depth to water as well as the severity of the contamination. The study focused on existing contamination sites and did not consider potentially contaminating activities.

In 1999, the District completed an evaluation of the sensitivity of the groundwater subbasins based on its intrinsic or hydrogeologic characteristics using the USEPA DRASTIC methodology.[86] The DRASTIC evaluation resulted in a GIS coverage which presents the relative sensitivity of different parts of the subbasins to contamination.[87]

In 2007, the District completed a study partially funded by the San Francisco Bay Water Board on the potential for groundwater contamination from past dry cleaner operations. The District ranked hundreds of operating and former dry cleaning operations for their potential to contaminate water supply wells based on the age and duration of dry cleaning operations, hydrogeologic factors, and municipal well construction. The study found that despite the high number of dry cleaning operations in the county, the impact on deep drinking water aquifers has been very limited.[88]

In October 2010, the District completed a comprehensive groundwater vulnerability study to assess the vulnerability of groundwater subbasins to land use activities.[89] This study updated the previous sensitivity study, incorporating recent hydrogeologic data and a statistical (rather than subjective) weighting approach. It also evaluated the vulnerability of the subbasins to different land uses. The study findings and related GIS tool have been used to help prioritize District work (including the review of high-threat contamination sites) and optimize the groundwater quality monitoring network. The District also met with several land use and regulatory agencies to discuss the potential use of the GIS tool to assist in their groundwater protection efforts.

6.2.5.2 Drinking Water Source Assessment and Protection Program (DWSAP)

The goals of the state's DWSAP required under the 1996 reauthorization of the federal Safe Drinking Water Act are as follows:

- Protect public water systems,
- Improve drinking water quality and support effective water resources management,
- Inform public and drinking water systems of contaminants and potential contaminating activities that have the

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[85] San Francisco Bay Water Board, Sanitary Engineering and Environmental Health Research Laboratory, University of Berkeley, and Santa Clara Valley Water District, Assessment of Contamination from Leaks of Hazardous Materials in Santa Clara Groundwater Basin, 205j Report, June 1985.
[86] USEPA, DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings, 1987.
[87] Santa Clara Valley Water District, An Analysis of the Sensitivity to Contamination of the Santa Clara Valley Groundwater Aquifers Based on the USEPA DRASTIC Methodology, 1999.
[88] Santa Clara Valley Water District, Study of Potential for Groundwater Contamination from Past Dry Cleaner Operations in Santa Clara County, 2007
[89] Todd Engineers and Kennedy/Jenks Consultants for the Santa Clara Valley Water District, Revised Final Groundwater Vulnerability Study, Santa Clara County, California, October 2010.

potential to affect drinking water,

- Promote a proactive approach to protecting drinking water quality and enable communities and drinking water systems to protect water quality,
- Refine and focus drinking water source monitoring requirements, and
- Focus pollution prevention and cleanup on areas that are subject to more serious threats.

The District assisted many of the local water retailers in their initial compliance with the state's DWSAP requirements in 2002 and 2003. The assessments included delineating well protection areas, inventorying possible contaminating activities, and analyzing the vulnerability of the source. The District developed a GIS based application, which was used to delineate protection areas in accordance with state guidelines. In addition, the District shared the application with the state DWSAP data advisory committee, on which the District was an active participant during development of the DWSAP implementation guidelines. Local water retailers are responsible for completing the DWSAP for all newly installed wells, and the District provides assistance upon request.

6.2.6 Coordination with Land Use Agencies

As land uses intensify, so does the potential for contaminating the underlying groundwater. In highly urbanized areas such as the Bay Area, there are numerous threats to groundwater resulting from commercial, industrial, and residential development. These threats include urban runoff, industrial chemical spills, and leaking underground storage tanks. Residential and agricultural use of nitrogen based fertilizers and pesticides can also impact groundwater quality. Coordination with land use agencies helps ensure groundwater quality is protected.

6.2.6.1 Land Use Review

Most land use decisions fall under the authority of local cities and the county. These agencies, the District, and the water retailers all desire to maintain high-quality water resources to serve current and future uses. These agencies work together to try to ensure that groundwater is adequately protected from potentially contaminating activities. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to the presence of high permeability soils and higher groundwater flow rates.

The District reviews some local land use and development plans to identify threats to groundwater and watercourses that are under District jurisdiction. The District also provides review and comment on environmental documents, and city and County General Plans. The District has also worked with land use agencies to develop guidelines or model ordinances for specific issues such as the permitting of graywater systems. The District works with the project and regulatory stakeholders to try to ensure that these projects are implemented such that groundwater resources are protected.

6.2.6.2 Onsite Wastewater Treatment Systems (Septic Systems)

The installation of Onsite Wastewater Treatment Systems (OWTS, or septic systems) is generally overseen by the County DEH under the Local Agency Management Plan (LAMP) as delegated by the Water Board. Permits are only issued in those areas of the county where a sanitary sewer is not available within 300 feet of the property line. An OWTS cannot be used if soil conditions, topography, high groundwater table, or other factors indicate that this method of sewage disposal is unsuitable. The County developed a wastewater disposal system ordinance that describes the requirements for development, site evaluation, septic system siting, installation, maintenance, and reporting.[90] Various permits are required to install a septic system and the systems are inspected prior to approving

[90] County of Santa Clara Ordinance No. NS-517.85, Onsite Wastewater Treatment Systems, December 2013.

completion of the installation.

6.2.7 Coordination with Regulatory Agencies

Sites with releases of solvents, toxics, fuels, or other contaminants pose a threat to groundwater quality since contamination may migrate laterally or vertically into areas or zones that were previously unaffected. If allowed to migrate, such contamination may eventually impact groundwater production wells, forcing well operators to cease operation, implement expensive wellhead treatment, or blend the affected water with other sources of water to dilute the contaminant. In addition, the degradation in water quality can limit the water's beneficial uses and alter plans for production well siting or design.

6.2.7.1 Hazardous Material Handling and Storage Oversight

The primary causes of groundwater contamination at hazardous material release sites are the improper handling of hazardous materials or leaking storage tanks. Permitting and inspection related to the handling and storage of hazardous materials is overseen by the local or county fire department. The fire departments also oversee the installation, operation, and removal of all underground and above ground storage tanks and associated piping, and notify the County DEH and/or Water Boards if contamination is discovered.

6.2.7.2 Contaminant Release Sites

There are more than 3,150 sites with environmental releases within the Santa Clara and Llagas subbasins, as summarized in Table 6-2. Most these releases (over 2,300) are leaking underground fuel tank (LUFT) sites. Fuel leak cases are overseen by the County DEH while the oversight agencies for the non-fuel leak sites vary, as shown in Table 6-3.

Table 6-2. Status of Contaminant Release Sites

Case Status	Santa Clara Subbasin		Llagas Subbasin	
	Cleanup Program Site	LUFT Cleanup Site	Cleanup Program Site	LUFT Cleanup Site
Site Assessment	68	32	2	1
Assessment and Interim Remediation	25	4	3	
Remediation	90	24	3	2
Verification Monitoring	34	23	1	
Eligible for Closure	11	28		
Inactive	105		1	
Open	333	111	10	3
Closed	309	2,231	10	151
Total	642	2,342	20	154

Table 6-3. Oversight of Contaminant Release Sites

	Santa Clara Subbasin	Llagas Subbasin
County DEH	2,289	131
San Francisco Bay Water Board (Region 2)	730	
Central Coast Water Board (Region 3)		30
City of Gilroy		15
US Environmental Protection Agency	12	
Department of Toxic Substances Control	2	2
State Water Resources Control Board	1	

Open and closed contaminant release sites in the Santa Clara and Llagas subbasins are shown in Figures 6-1 and 6-2, respectively. These figures include data available through the State Water Board's GeoTracker system, and do not represent all contaminant release sites in the county. As the county's groundwater management agency, the District works with these agencies to protect groundwater resources. Current District interaction with regulatory agencies on point-source cases is mainly focused on the highest threat cases in the county, or is in response to specific requests from the agencies.

Figure 6-1. Contaminant Release Sites in the Santa Clara Subbasin

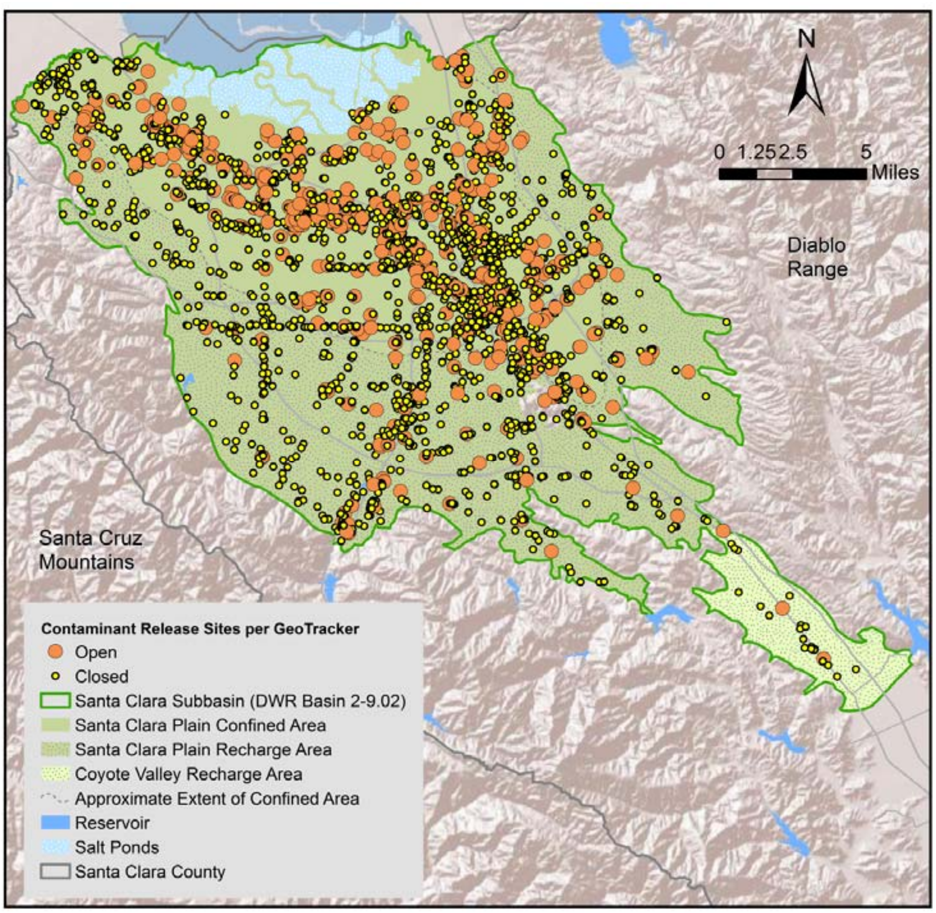
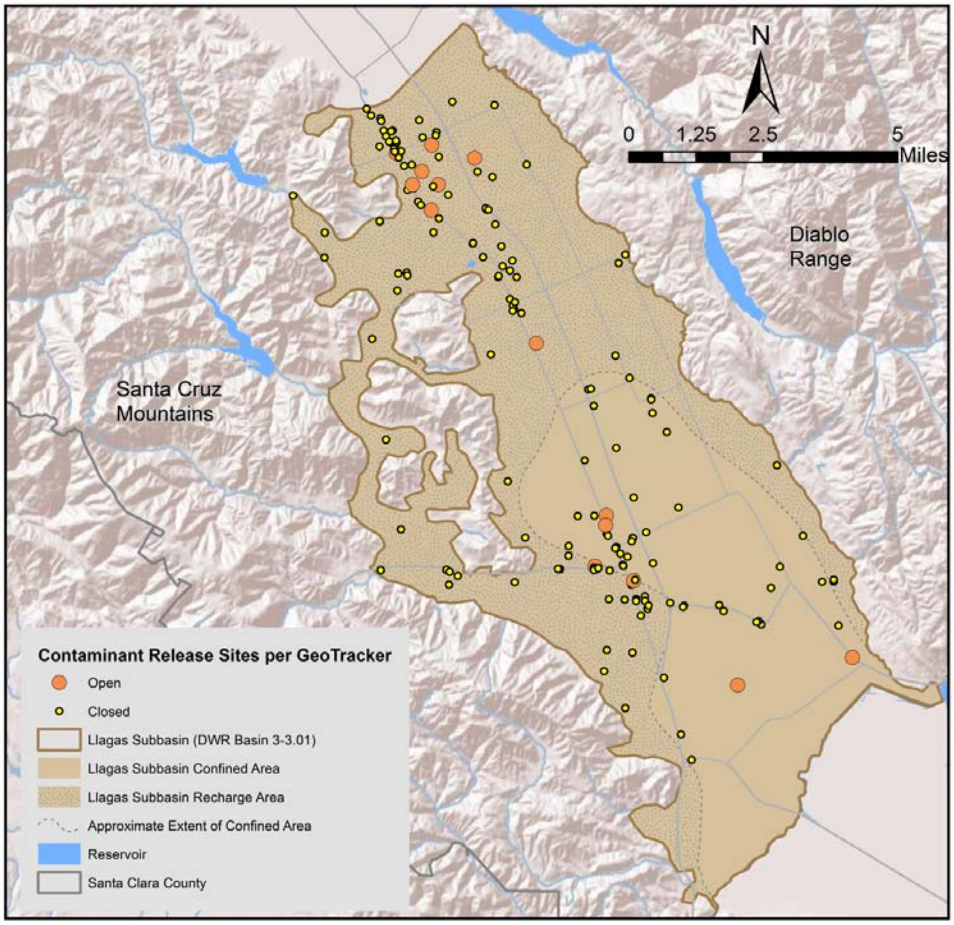


Figure 6-2. Contaminant Release Sites in the Llagas Subbasin



6.2.8 Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. To increase public awareness of groundwater resources, the District conducts active public outreach programs, which are described in this section. Also, each year, the District celebrates Groundwater Awareness Week, which is an annual observation of the importance of groundwater and is celebrated by the National Groundwater Association, the U.S. Environmental Protection Agency, and other organizations advocating groundwater protection.

6.2.8.1 Outreach Materials

The preparation of pamphlets, fact sheets, and summary reports helps to transmit key messages related to groundwater. The District's Guide for the Private Well Owner, which is provided to all new well owners in the county, describes the basics of proper well construction, maintenance, and testing. The District also produces fact sheets to address specific issues, such as nitrate or perchlorate, or to summarize the results of groundwater studies, like the Recycled Water Irrigation and Groundwater Study.

6.2.8.2 School Program

The District believes it is never too early for children to begin understanding and appreciating their local water resources. To help promote that awareness, the District offers a full range of educational programs for both teachers and students. From puppet plays for kindergarteners to workshops for educators, school outreach projects provide effective, hands-on learning experiences that meet new state standards. Through the District's educational programs, students can tour a groundwater recharge facility, create a simulated pond or explore the plant and animal life in a creek. All activities are geared for specific grade levels, from pre-kindergarten to college.

6.2.8.3 Groundwater Guardian Program

The Groundwater Guardian Program is sponsored by the Groundwater Foundation, a not-for-profit education organization that strives to increase groundwater awareness. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. The District has been designated a Groundwater Guardian based on such activities as conducting irrigation and nutrient management seminars, creating a prototype zone of contribution delineation tool for wellhead protection areas, and conducting the school program. The District will continue to participate in the program by submitting annual work plans for groundwater protection activities and submitting reports documenting our groundwater protection efforts. The District was designated as Groundwater Guardian Affiliate in 2000 and has maintained that designation each year since then.

6.3 PROGRAMS RELATED TO SURFACE WATER/GROUNDWATER INTERACTION

The District has been conducting managed recharge of the Santa Clara and Llagas subbasins with locally captured and imported water for many decades. The District’s managed recharge program is an important management tool that has contributed to groundwater storage recovery, cessation of inelastic land subsidence, prevention of salt water intrusion, and improved water quality. A reliable water supply for the county depends on this interaction between surface water and groundwater, and as such, the District closely monitors recharge operations.

The addition of water through managed or incidental recharge can change groundwater quality. This may be for the better by diluting existing contaminants in the aquifer, or for the worse by introducing contaminants. Incidental recharge includes water applied to landscape and agriculture in excess of plant uptake (irrigation return flows), as well as infiltration from stormwater and septic systems.

District programs related to surface water/groundwater interaction are described below.

6.3.1 In-Stream Releases of Surface Water

As described in Section 6.1.1, the District conducts active in-stream managed recharge operations along approximately 110 miles of stream channel in over 30 creeks. About two-thirds of the District’s managed recharge occurs through in-stream recharge facilities, with over 60,000 AF recharged as a result of District releases into creeks in most years. In 2015, a drought year, in-stream managed recharge was reduced to around 27,000 AF. The District also coordinates operations for flashboard dams and spreader dams under agreements with the DFW. District recharge operations along streams have been modified in recent years to reflect environmental regulations and concerns, including the protection of native fisheries.

6.3.2 Stormwater Management

To reduce the amount of runoff to creeks and other surface water bodies, urban runoff programs are increasingly promoting the infiltration of stormwater into the groundwater instead of facilitating its runoff into creeks. Infiltration of runoff helps reduce peak flows and protect surface water quality. Stormwater can also be a beneficial

source of groundwater recharge in some areas, but there are potential groundwater quality impacts. Stormwater can pick up pollutants as it runs over the ground surface, which can then migrate to groundwater via soil infiltration.

The District is part of the Santa Clara Valley Urban Runoff Management Program, which was formed in 1990 to develop and implement efficient and uniform approaches to control non-point source pollution in stormwater runoff that flows to the South San Francisco Bay. The District has worked with the other co-permittees of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) to develop guidelines that allow stormwater infiltration while being adequately protective of both surface water and groundwater resources.

There are three main types of controls that promote infiltration. They are site design measures, indirect infiltration methods, and direct infiltration methods. Site design measures involve laying out a development site to reduce the amount of impervious area and routing drainage to landscaped areas. Indirect infiltration methods include directing runoff to bioretention areas, vegetated buffer strips, and to unlined detention ponds. These methods rely on the shallow soil to “filter” the water before it reaches groundwater.

The third method, direct infiltration, sometimes referred to as stormwater infiltration devices (SWIDs), uses devices that bypass the surface soils, thereby bypassing the filtration effects of the surface soils. Types of direct infiltration devices include dry wells, injection wells, and french dry wells are a type of SWID that reduce or eliminate the vertical separation between the infiltration point and groundwater. Because they bypass natural filtering capacity of soils, dry wells are of special concern. Specific standards for direct infiltration devices are being developed by the State of California. The purpose of revising the policy is to unify permitting and construction standards so that all devices that bypass natural protection processes are subject to standards for protecting groundwater, and to simplify the process by which SWIDs are permitted.

6.3.3 Salt Water Intrusion Prevention

The movement of saline water into a freshwater aquifer constitutes salt water intrusion. This potential exists in groundwater basins adjacent to the sea or other bodies of saline water – in this case, the southern portion of San Francisco Bay. Once freshwater aquifers experience severe salt water intrusion, it is extremely difficult and costly to reclaim them. Classic salt water intrusion is driven by overpumping that reverses the normal seaward flow of groundwater. Locally, however, the mechanism of intrusion is quite different since aquifers underlying the bay do not outcrop offshore and are not directly connected to the bay. Rather, the aquifers are blanketed by a very fine-grained fully saturated clay formation known as ‘Bay Mud’ which effectively seals them from classic salt water intrusion regardless of the direction of groundwater flow.

The northern portion of the Santa Clara Plain experienced an atypical mode of salt water intrusion, which primarily affects the shallow aquifer and has created a wide mixed transition zone between fresh groundwater and salinity impacted groundwater. With long-term groundwater overdraft inducing high rates of land subsidence in the decades following World War II, salt water contamination of the shallow aquifer was being observed. By the 1980s, mild salt water intrusion encompassed a substantial area bounded on the south, west, and east by Highway 101 and Interstate 880. Flattened stream gradients caused by land subsidence resulted in increased inland migration of saline bay water through tidal creeks. This saline water was subsequently transported to groundwater through streambed percolation and the presence of abandoned wells and other deep excavations.

Historically, the District conducted an extensive program of locating and properly destroying old abandoned wells in the northern Santa Clara Subbasin along the bay so that these wells would not act as conduits for salt water intrusion of the principal aquifer. Ordinance 85-1 gave the District authority to require owners of wells determined to be “public nuisances” to seal and destroy the wells or upgrade them to active or standby status. A more comprehensive well sealing program was in place from 1984 to 2005 that provided financial assistance to properly destroy abandoned wells near areas of known contamination to prevent the tainting of drinking water supplies.

Although this assistance program has now ended, abandoned or unused wells are still required to be sealed in accordance with District and State well standards.

The resumption of land subsidence and sea level rise are perhaps the greatest potential threat to aggravating salt water intrusion. Land subsidence would further depress the land surface fronting the Bay. Both land subsidence and sea level rise would expose a larger portion of the shallow aquifer to intrusion from increased inland tidal incursion of bay water. A lowering of the hydraulic head in the principal aquifer zone may also increase the potential for salinity intrusion if there were leakage or breaches through the Bay Mud. The District's managed recharge program is critical to maintaining adequate pressure in the principal aquifer zone adjacent and underlying the southern portions of the Bay, which helps protect the long-term viability of the resource. As described below in Chapter 7, land subsidence, groundwater elevations, and groundwater quality are actively monitored to minimize risks related to salt water intrusion.

6.3.4 Watershed Management

The District captures large volumes of upper watershed stormwater runoff in local reservoirs and manages flows in creeks. Because groundwater sustainability depends on the recharge of local watershed water, the protection of these source waters is essential. The protection of the watersheds' water quality is also vital to assuring a healthy environment for their inhabitants. The District seeks to balance watershed uses, such as the rights of private property owners and public recreational activities, with the protection and management of natural resources. The District recognizes that preserving beneficial watershed uses can benefit reservoir water quality, which in turn benefits the quality of the water delivered to the District treatment plants and recharged into the groundwater subbasins.

The District works to protect the water quality and water supply reliability of the District's reservoirs through regular monitoring, coordination with other agencies on water quality issues, and through activities to protect local reservoirs from potentially contaminating activities. The District also implements projects to address pollutants affecting freshwater, such as mercury contamination.

The District has also developed guidelines and standards for land use near streams. These guidelines were developed in cooperation with local cities, the county, local businesses, agriculture, streamside property owners, and environmental groups through the Water Resources Protection Collaborative.

The District's One Water Plan integrates the water supply, flood protection, and stream stewardship missions of the District at the watershed scale. Drawing from detailed existing programs and plans, One Water seeks to find the nexus between these three mission components for new opportunities in integrated water resources management. One Water does not replace the substantial existing planning in place by the District's Water Utility Enterprise and the Watersheds Division but instead looks for opportunities to further protect and enhance water resources. The One Water Plan is a long-term endeavor that seeks to build up to long-term improvements in water resources management and watershed conditions. One Water will operate under the current commitments, regulations, and existing restrictions and challenges that drive District operations and day-to-day work. This means that not all strategies will be practicable and not all goals and objectives can be carried out simultaneously. In the end, however, the established framework called out in the One Water Plan identifies a roadmap for integrated water resources management for the future. Not all District activities can be integrated, nor all activities managed under One Water, but all types of water will be considered in building upon past successes to manage these valuable resources as One Water.[91]

[91] https://onewaterplan.wordpress.com/about-2/

Chapter 7 – Groundwater Monitoring and Modeling

CHAPTER 7 – GROUNDWATER MONITORING AND MODELING

The District conducts a wide range of activities to maintain a reliable water supply, protect groundwater quality, and avoid further land subsidence. Assessing how well these activities are meeting the basin sustainability goals requires effective monitoring. This chapter describes programs to monitor groundwater levels, land subsidence, groundwater quality, and surface water, and provides information on the availability of related data.

The District's network of water level and water quality monitoring wells is the product of an adaptive and opportunistic regional data collection effort that has evolved over many decades. The network includes wells installed by the District, existing wells the District has obtained, and privately-owned wells for which the District has secured monitoring access. Consequently, it is unlike a network one might expect if it were designed from the ground up such as at a contaminated site. While the District network covers the groundwater subbasins, the wells are not evenly distributed due to the constraints of the existing built environment. The District supplements data collected through this network with data collected by water retailers as described further below.

For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well condition or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins.

7.1 GROUNDWATER LEVEL MONITORING

This section describes the methodology, data collection, data analysis, and reporting for the District's groundwater level monitoring, which includes District wells and privately-owned wells. The data collected is supplemented by data provided by water retailers.

7.1.1 Groundwater Monitoring Network and Frequency

The District measures depth to water at several hundred wells and receives data from water retailer wells. In some locations, the District has collected regular water level data for up to 70 years and third-party data has been collected continuously since 1936 in downtown San Jose. Available historical data include several one-time collection efforts. Monitoring locations and frequencies have evolved over time to support groundwater supply assessment and forecasting, recharge operations, efforts to monitor concentrated pumping and land subsidence, and other purposes.

Currently, the District measures 216 wells regularly, including 158 wells in the Santa Clara Subbasin and 58 in the Llagas Subbasin. To assist in the District's regional evaluation of groundwater conditions, several water retailers provide water level data from over 100 production wells, all of which were measured quarterly, monthly, or more frequently in 2016. This data is entered in the District's database for inclusion in regional condition and trend analysis. Groundwater level monitoring frequency is summarized in Table 7-1, with well locations shown in Figures 7-1 and 7-2. Appendix E includes detailed information on well location, construction, and measurement.

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Table 7-1. Groundwater Level Monitoring Frequency

Frequency	Santa Clara Subbasin		Llagas Subbasin	Total
	District-Monitored Wells	Retailer-Monitored Wells[1]	District-Monitored Wells	
Daily	69	0	14	83
Weekly or Biweekly	4	8	0	12
Monthly	85	92	43	220
Bimonthly	0	3	1	4
Quarterly	0	6	0	6
Total	158	109	58	325

1. Indicates the number of retailer wells for which data is provided to the District.

Figure 7-1. Santa Clara Subbasin Groundwater Level Monitoring Wells

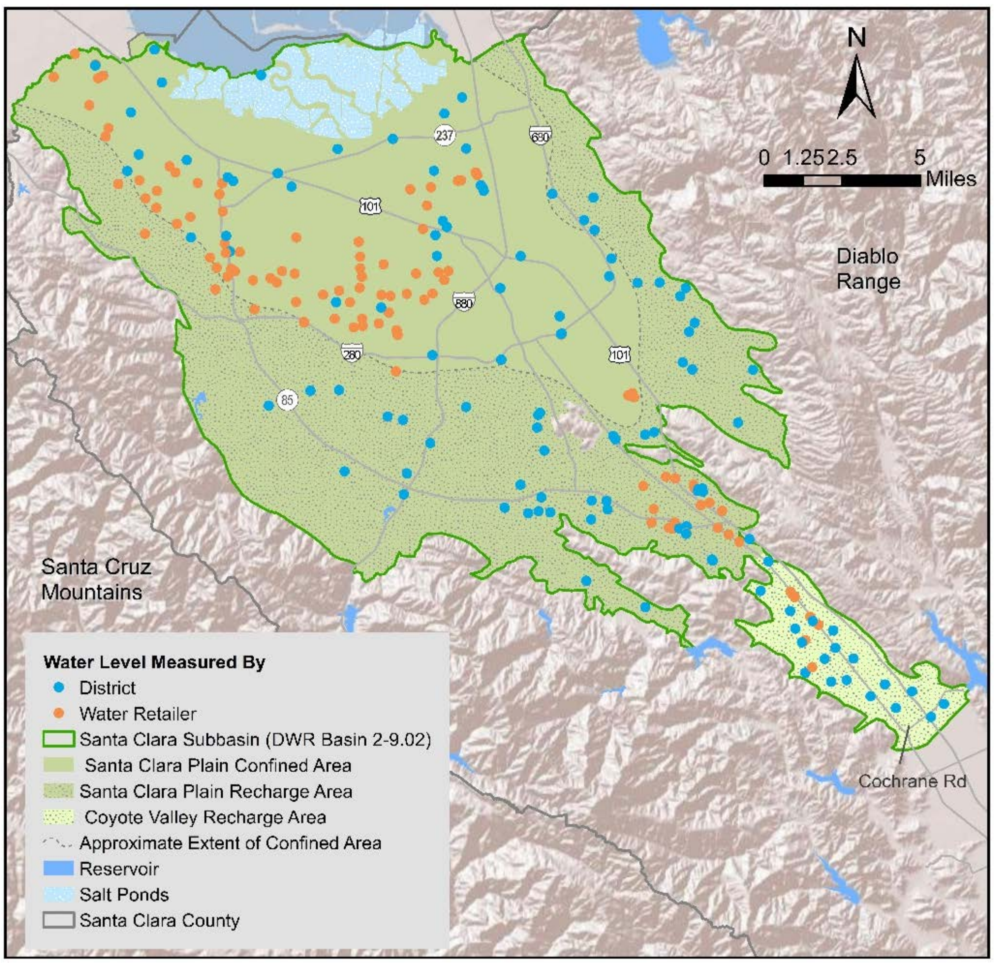
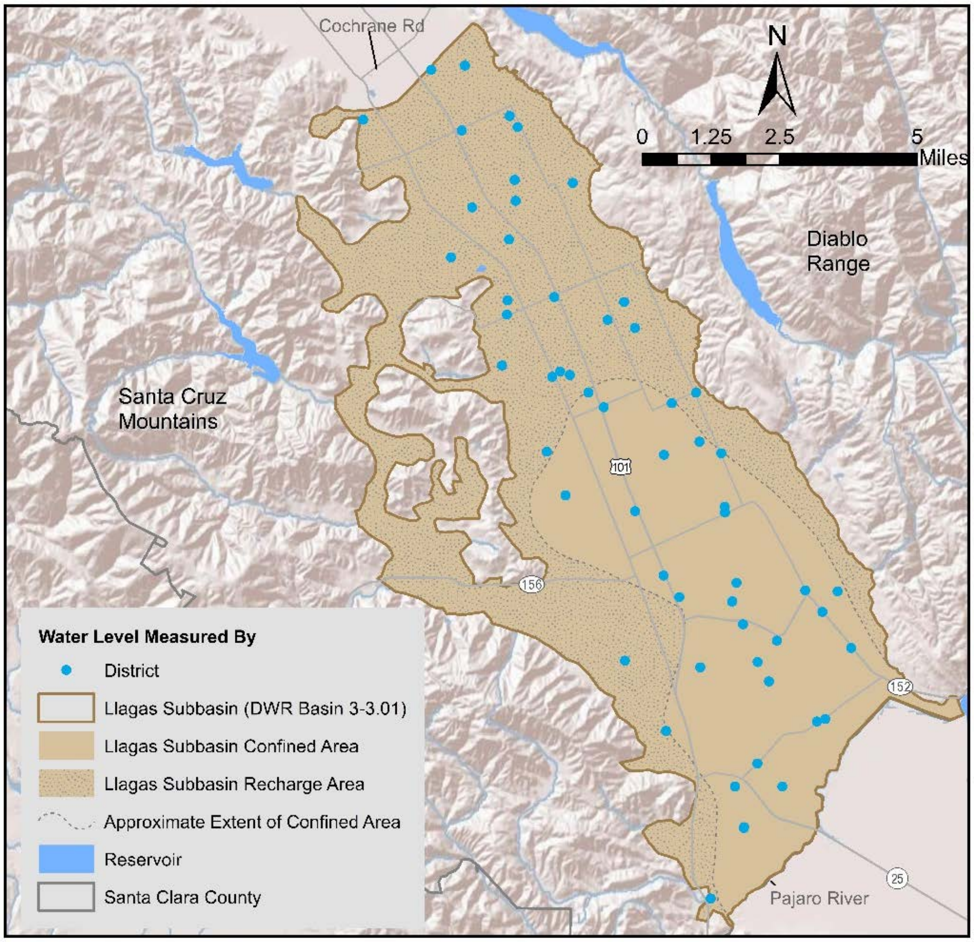


Figure 7-2. Llagas Subbasin Groundwater Level Monitoring Wells



7.1.2 Measurement Methodology

This section presents the District methodology to measure groundwater levels, including information on reference points, depth to water measurements, and instrument calibration.

7.1.2.1 Ground Surface and Measuring Point Elevation Measurement

Ground surface elevations at wells monitored are determined by land surveys or are interpolated from topographic and LIDAR (Light Imaging, Detecting, and Ranging) maps. The accuracy of the map interpolations ranges from ± 1.5 feet for LIDAR maps to ± 5 feet for the topographic maps. The land survey accuracy is ± 0.05 feet. The approximate breakdown of ground surface elevation methods for water level monitoring wells is follows: land survey (50%), LIDAR (30%), topographic maps (20%). The District is working to have all groundwater level monitoring well elevations surveyed as resources allow.

Depending on the well monitored, the depth to water reading may be taken from various measuring points, including the top of the well casing, utility vault, or other point. Measuring point elevations are determined by either land surveying or manual measurement from the ground surface.

7.1.2.2 Manual Depth to Water Measurement

Manual depth to groundwater measurements are obtained with the use of electric sounders, steel tapes, air lines, and pressure gauges. Whenever possible, depth to groundwater is measured in wells that have not been pumped recently; otherwise the measurement is flagged as a pumping water level. More than 98% of the nearly half million water level records maintained in the District's database are static measurements made at wells that have not been pumping. Pumping readings are obtained from water retailers and at agricultural wells. Subtracting the depth to water from the measuring point elevation provides the groundwater elevation with respect to mean sea level. Table 7-2 summarizes the measurement methods used by the District and the accuracy of each.

Electric sounders are the method most commonly employed by the District to obtain groundwater level readings. These sounders use a long tape measure/wire on a reel attached to a weighted electric sensor. The sensor is lowered to contact water standing in a well to complete a circuit and sound an audible alarm. Once the alarm sounds, the technician records the water depth from an established measuring point as indicated on a graduated tape. The accuracy of this method is generally ±0.1 feet in production wells and can be within 0.05 feet in monitoring wells.

Table 7-2. Manual Depth to Water Measurement Methods and Accuracy

Device	Accuracy (feet)
Airline	± 1
Electric Sounder	± 0.05 to ±0.1
Pressure Gauge	± 0.5
Pressure Transducer	± 0.01
Steel Tape	± 0.1

Electric sounders, pressure gauges and pressure transducers are the most common District water level measurement methods. Approximately fifty wells are under artesian pressure during at least part of the year, particularly during years with above-average rainfall. Artesian pressure is measured by attaching a pressure gauge to a fitting on the wellhead. The pressure is measured in PSI (pounds per square inch) and converted to feet of equivalent head of water above ground surface using a multiplier of 2.307 ft per PSI. This is the level the water would rise to if the well casing extended that far above the ground. However, it is not the level to which water would rise if the well were uncapped, as pressure quickly dissipates and well efficiency impedes high pressure flows. The District has equipped several of the artesian monitoring wells with pressure transducers, dataloggers, and telemetry equipment. All artesian wells are equipped with fittings to allow pressure readings when they are under artesian pressure.

In some cases, the District measures depth to water using steel tapes, which are weighted, graduated lines. The end of the line is chalked so that the field technician can confirm contact with water. If lubricating oil is floating on the well water, electric sounders are ineffective. In a small number of actively monitored wells, a steel tape is used to measure depth to water beneath the oil layer. The oil layer thickness is not measured, but is not expected to significantly affect the data.

Air lines are used by some water retailers to apply air pressure to a calibrated tube whose end is submerged in the well. In the airline method, water level is determined by calculating the head corresponding to the maximum air pressure required to displace water in the tube.

7.1.2.3 Automated Depth to Water Measurement

The District deploys pressure transducers and data loggers in 87 wells. Telemetry equipment has been installed at 23 locations, comprising 33 wells or discrete-depth monitoring points, allowing remote data retrieval by cellular phone. Pressure transducer data must be corrected to remove the influence of atmospheric pressure. Using a barometer connected to a data logger and telemetry installation, raw data are merged with barometric data prior water levels recorded by transducers. The District's water level automation system permits the collection of nearly continuous data to observe responses to hydrologic events such as rainfall, recharge operations, and pumping, while also reducing staff time required for collecting water level data.

Pressure transducers provide more precise measurements of relative water level changes than can be obtained by electric sounders or pressure gauges. To obtain absolute measurements relative to a common datum, pressure transducer data is integrated with land survey data and electric sounder measurements. Pressure transducer measurements are validated against manual measurements as described below.

7.1.2.4 Water Level Instrument Calibration

Water level measurement accuracy depends on the accuracy of the measuring instruments. Staff periodically checks water measurement equipment for accuracy and calibrates if necessary. Electric sounders are generally highly accurate and reliable, with little changes in accuracy over time. However, the District checks the calibration every few years or after repair to ensure their accuracy is within the acceptable tolerance of ± 0.1 feet per hundred feet. If electric sounders are found to be out of calibration, a correction factor is applied to the measurements. Pressure gauges are checked against an in-house standard gauge. A correction factor is added to the pressure measurements as needed. Staff controls for potential instrumental drift in pressure transducers by comparing their readings to either the readings of the electric sounders or the pressure gauges, depending on whether the well is artesian or not. The pressure transducers are checked for drift monthly as new electric sounder or pressure gauge measurements are obtained. During the conversion of the pressure reading from PSI to feet, a correction factor is applied offset the drift and bring the transducer measurements in line with the manual depth to water readings.

7.1.3 Data Management

District water level data management includes converting the raw data to groundwater elevation, validating and approving the data, and storing the data in a secure database.

Data conversion involves transforming depth to water and pressure measurements to groundwater elevations. For depth to water measurements, the field readings are subtracted from the measuring point elevations to get groundwater elevations. To measure artesian wells, pressures are converted into feet of water (head) above the measurement points. These heads are then added to the measuring point elevations to get groundwater elevations. Converting pressure transducer measurements in non-artesian wells involves several steps. First, atmospheric pressure (recorded within an hour of the measurement) is removed from the total pressure to obtain the water pressure above the transducer. These water pressures are then converted to feet of water above the sensor. Using the measured depth of the sensor, head readings are converted to groundwater elevations.

To ensure data is accurate, the District validates groundwater level data collected in the field prior to database upload. The District compares new measurements to historic water levels as an initial screening criterion, and tentatively validates manual measurements that are within historic norms. Values that fall outside of the historic data are further inspected to determine if there were collection errors. Elevations generated by transducers are checked by comparing them to concurrent manual depth to water measurements. When discrepancies are detected, new conversion factors are generated and the data is reprocessed to bring the data within ± 0.5 feet of the manual measurement. As a final step in validation, the new data is graphed with recent historic data to look for

outliers and continuity. Suspect data points are investigated for validity. The valid data is then transferred to an Electronic Data Deliverable (EDD).

Data approval involves spot checking EDD data for accuracy. If errors are found, the data for that well is reprocessed. Once all known errors are corrected, the data is uploaded to a permanent, secure database.

7.1.4 Reporting and Communication

Water level data is reported or made available in a variety of formats. The District's monthly Water Tracker includes high-level information on regional index wells in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin. The monthly Groundwater Condition Report provides more detail, presenting water levels for 11 regional index wells, as well as monthly estimates of pumping and recharge. The District generates potentiometric surface maps (groundwater elevation contour maps) for the spring and fall each year for inclusion in the District's Annual Groundwater Report. This report also provides information on current water level conditions compared to the previous year and long-term conditions. The District is also the Designated Monitoring Entity for Santa Clara County under the CASGEM program, and updates the DWR CASGEM database with water levels from 106 wells quarterly. District reports are available at www.valleywater.org. All water levels in the District's water level database are available through an online portal, which allows users to find data by entering a location or well number, or by using the map feature.[92]

7.2 LAND SUBSIDENCE MONITORING

The District maintains and monitors a land subsidence monitoring network in the northern portion of the Santa Clara Subbasin (Santa Clara Plain) to determine if land subsidence is occurring or threatening to exceed established subsidence thresholds. Land subsidence monitoring includes annual level surveys along three established routes and continuous measurement of vertical ground movement at two extensometers (also called compaction recorders). Groundwater level monitoring is an integral part of the land subsidence monitoring program since long-term overdraft and water level decline was the driving force of historical land subsidence in the Santa Clara Plain. Water levels in ten subsidence index wells are measured at least monthly.[93] Figure 7-3 presents the District's land subsidence monitoring network, including the leveling circuits, extensometers, and water level wells used to track the potential for subsidence.

7.2.1 Annual Benchmark Elevation Surveys

Periodic level surveys of land elevation have been conducted in northern Santa Clara County to gauge land subsidence induced by groundwater overdraft since 1934.[94] The District conducts annual surveys each fall to determine the elevations of about 150 survey benchmarks along two east-west circuits and one north-south circuit in the Santa Clara Plain. Changes in benchmark elevations are tracked year to year, and are evaluated with data collected at extensometers and subsidence index wells.

7.2.2 Extensometer Monitoring

The District collects data from two extensometers installed by the USGS in 1960 to monitor the magnitude and rate of subsidence in the Santa Clara Plain. The USGS terminated its field monitoring in 1983, at which time monitoring was transferred to the District. The two extensometer sites are continuously monitored; one in Sunnyvale near

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[92] https://gis.valleywater.org/GroundwaterElevations/

[93] One retailer well used as a subsidence index well was destroyed in September 2016 and will be replaced by a nearby well with similar water level patterns.

[94] Poland and Ireland, Land Subsidence in the Santa Clara Valley, California, as of 1982, 1988.

Moffett Field ("Sunny") and the other near downtown San Jose ("Martha"). Water level measurements are also recorded at both extensometer sites.

The extensometers measure vertical ground motion relative to a point 1,000 feet deep using a pipe set beneath the water-bearing aquifers that have the potential to compress and cause subsidence. To measure the change in land surface elevation, it is assumed that the pipe is fixed at the bottom and that the soil between the pipe bottom and the land surface is expanding or compressing. To accurately measure these land surface changes, the District uses several redundant instruments. The primary instrument is a linear potentiometer, which is calibrated to convert voltage readings into land surface elevation changes with an accuracy of ± 0.00001 feet. Hourly readings (averaged from 10 minute measurements) are stored in a data logger that sends the data to the District via cellular-based telemetry. The District also records readings from a dial gauge, which has an accuracy of ± 0.0001 feet, and a graduated tape that has an accuracy of ± 0.01 feet. Lastly, a paper drum chart continuously records land elevation changes. Readings from the linear potentiometer and the dial gauge are entered into a District database. Figure 7-4 shows the San Jose extensometer.

Figure 7-3. District Land Subsidence Monitoring in the Santa Clara Plain

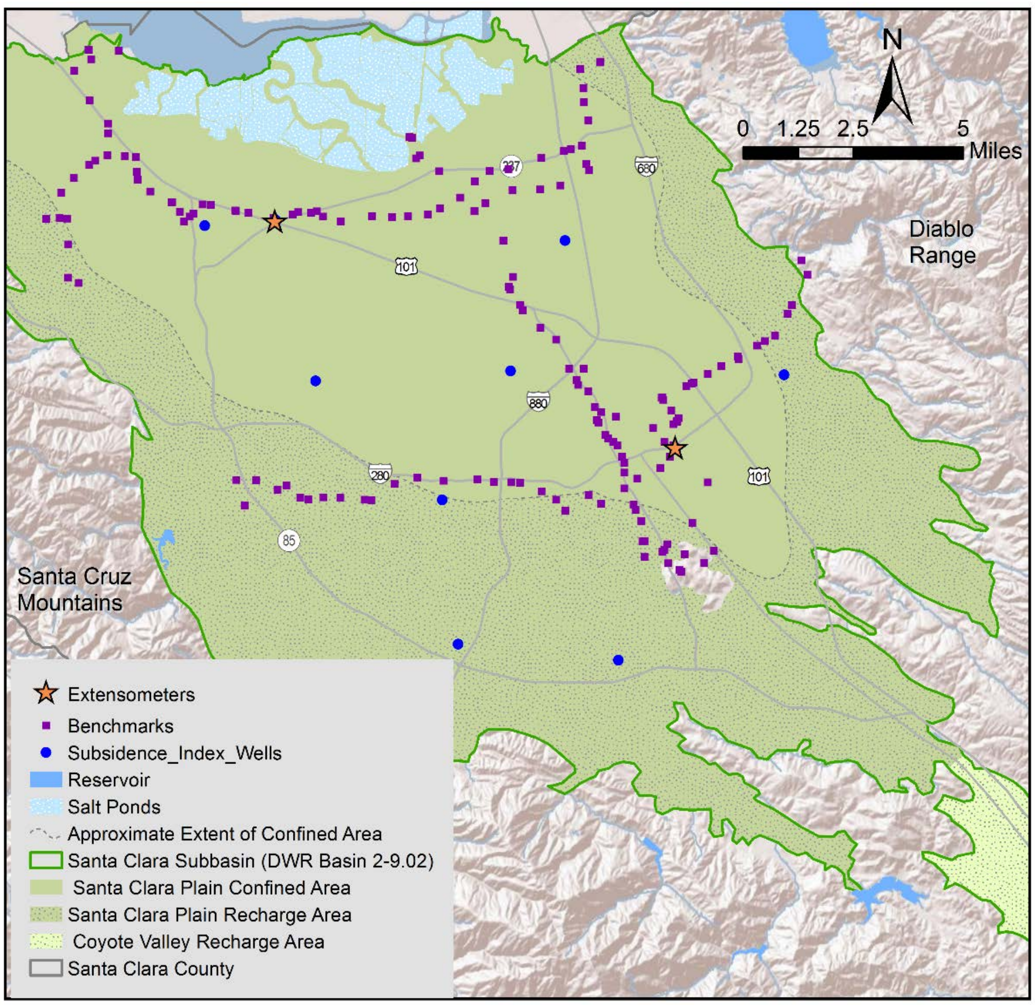


Figure 7-4. San Jose ("Martha") Extensometer

7.3 GROUNDWATER QUALITY MONITORING

The District conducts ongoing monitoring to assess groundwater quality in the Santa Clara and Llagas subbasins, including regional monitoring, domestic well sampling, and focused monitoring near recycled water irrigation sites and areas of historic salt water intrusion. This section describes the District monitoring, including wells monitored, parameters analyzed, monitoring frequency, and reporting. It also provides information on monitoring by water retailers and other agencies.

The goal of the District's monitoring is to collect data to support the evaluation of the following:

- Regional groundwater quality conditions for the shallow and principal aquifers of the Santa Clara and Llagas subbasins
- The extent and severity of contamination, including the presence of contaminants above drinking water standards,
- Changes in water quality over time,
- Potential threats to the long-term viability of groundwater resources, and
- Groundwater Management Plan outcome measures.

7.3.1 Regional Groundwater Quality Monitoring

For regional groundwater quality monitoring, the District characterizes two aquifer systems, the shallow and the principal aquifer zones. The shallow aquifer combines all water-bearing zones above a depth of 150 feet, which is approximately the base of regional confining layers in both the Santa Clara and Llagas subbasins. There are some exceptions, but generally wells completed in the shallow aquifer are not used for drinking water. The principal aquifer is comprised of wells greater than 150 feet deep, where most water supply wells are screened.

7.3.1.1 District Groundwater Quality Monitoring Network and Frequency

Like the District's water level monitoring network, wells included in the groundwater quality monitoring network include District-installed monitoring wells, monitoring wells the District has obtained, and privately-owned wells, including active domestic, agricultural wells, and other water supply wells. The District constructed multi-level nested monitoring wells at 9 locations in the Santa Clara Plain in cooperation with the USGS. These wells allow depth-discrete sampling to discern water quality variation with depth, with the deepest casings at some wells extending below 1,000 feet.

The groundwater quality monitoring network in the Santa Clara Subbasin comprises 55 wells, the distribution of which is presented in Table 7-3 and Figures 7-5 and 7-6. The Santa Clara Plain Baylands is the area near San Francisco Bay that has historically been affected by salt water intrusion. The Llagas Subbasin monitoring network is comprised of 36 wells as shown in Table 7-4 and Figures 7-7 and 7-8. This data is augmented by data collected by water retailers at over 200 wells each year as described in Section 7.3.2. Detailed information on the location and construction of all wells monitored by the District is in Appendix E.

Table 7-3. Santa Clara Subbasin Groundwater Quality Monitoring Summary

Area	Shallow Aquifer Zone	Principal Aquifer Zone	Total
Santa Clara Plain Baylands	18	--	18
Santa Clara Plain	12	20	32
Coyote Valley	--	5	5
Total	30	25	55

Table 7-4. Llagas Subbasin Groundwater Quality Monitoring Summary

Area	Shallow Aquifer Zone	Principal Aquifer Zone	Total
Llagas Subbasin	15	21	36

The District collects samples from all groundwater quality monitoring wells annually in the fall. The frequency of analysis for specific parameters varies per a fixed schedule depending on persistence or variability of that constituent as shown in Table 7-5 and described further in the next section.

Figure 7-5. Santa Clara Subbasin Shallow Aquifer Groundwater Quality Monitoring Network

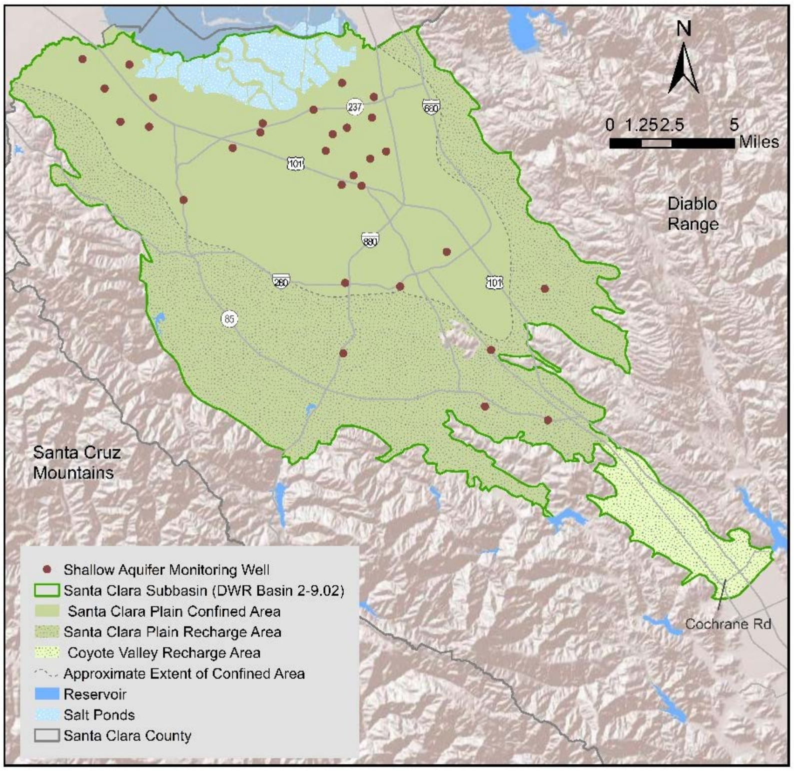


Figure 7- 6. Santa Clara Subbasin Principal Aquifer Groundwater Quality Monitoring Network

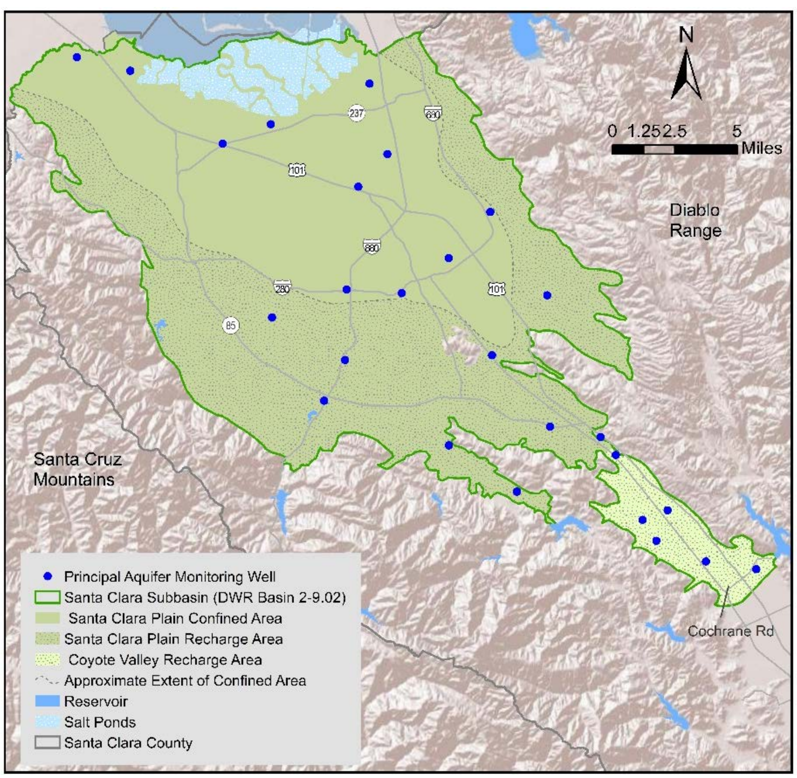


Figure 7-7. Llagas Subbasin Shallow Aquifer Groundwater Quality Monitoring Network

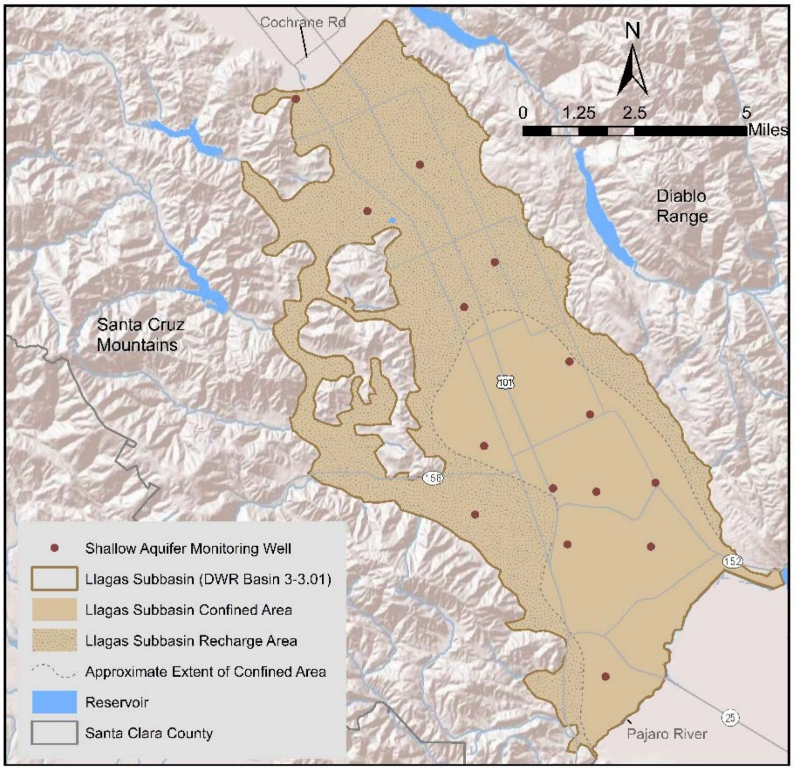
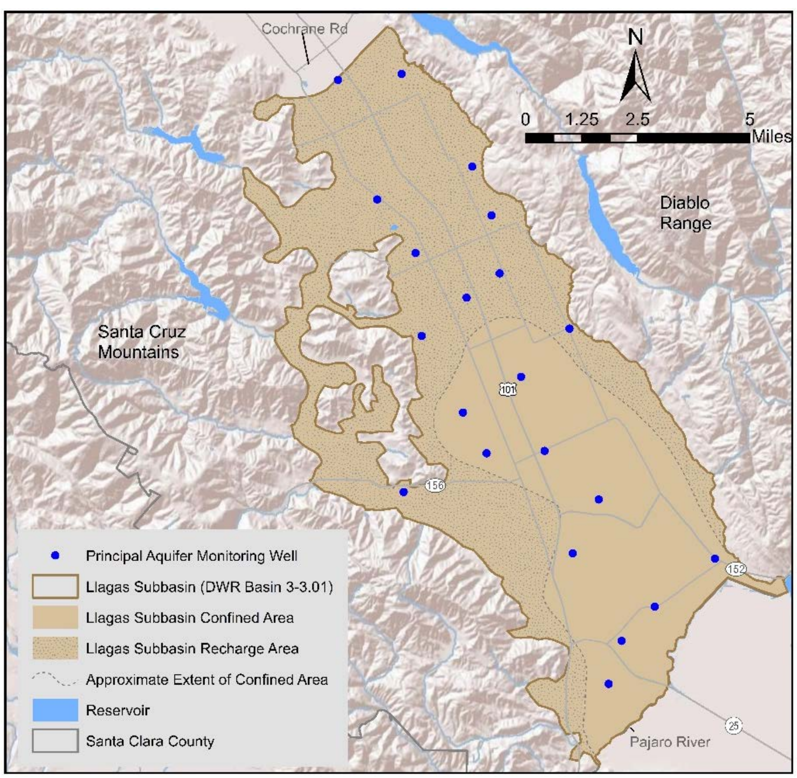


Figure 7-8. Llagas Subbasin Principal Aquifer Groundwater Quality Monitoring Network



7.3.1.2 Monitoring Parameters

Each fall, the District analyzes major and minor ions and nutrients at all wells. Major inorganic parameters analyzed include calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulfate, and silica. These common parameters account for the vast majority of all dissolved matter in water derived from natural sources. The District also analyzes common metals, nutrients, salts, and field parameters as shown in Table 7-6.

Every three years, the District monitors volatile organic compounds (VOCs) at all wells. Although detections of VOCs are rare in the principal aquifer zone, with many VOC contaminant release sites in the county, it is prudent to occasionally analyze the water for them.

Local groundwater has been analyzed for pesticides in the past by the District and water retailers. The results have been primarily non-detect with only sporadic, isolated detections at very low levels. The need for future pesticide analysis by the District will be evaluated over time based on changes in drinking water standards, changes in land use, and public water system sampling results.

Table 7-5 presents the monitoring schedule and parameters to be tested in each regional well monitored by the District, with associated analytical methods in Table 7-6. The list of parameters monitored is expected to be somewhat dynamic as new information becomes available. Additional contaminants may be analyzed as necessary to evaluate specific threats or concerns as they arise. Analysis of some constituents may be discontinued if multiple sampling events show the analytes are not present.

Table 7-5. District Groundwater Quality Monitoring Analytical Schedule

Monitoring Wells	Parameters Groups Monitored and Frequency				
	Major Ions	Nutrients	Trace Elements	VOCs	Chloride, pH, EC
Regional Monitoring Wells	Annual	Annual	Annual	Triennial	--
Salt Water Intrusion Monitoring Wells	Triennial	Triennial	Annual	--	Annual

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Table 7-6. District Regional Groundwater Quality Monitoring Parameters and Analytical Methods

Parameter Group	Parameter	Analytical Method
Trace Elements	Aluminum, Boron, Iron, Lithium, Zinc	EPA 200.7
	Antimony, Arsenic, Barium, Beryllium, Chromium (Total), Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium	EPA 200.8
	Mercury	EPA 245.1
	Chromium 6	EPA 218.7
Ions	Alkalinity, Bicarbonate	SM2320B
	Total Dissolved Solids	SM2540C
	Chloride	SM4500-Cl
	Calcium, Magnesium, Potassium, Silica, Sodium	EPA 200.7
	Fluoride, Bromide, Sulfate	EPA 300.0
	Hardness	SM2340 C
	Perchlorate	EPA 314.0
Nutrients	Nitrate, Phosphate	EPA 300.0
Field	pH, Specific Conductance, Temperature	Field
VOCs	All VOCs included in method EPA 524 (analyzed every three years)	EPA 524

7.3.2 Public Water Supplier Monitoring

Local water retailers and other public water suppliers serving groundwater analyze well water samples to comply with DDW requirements and support operational decisions. In general, compliance monitoring is completed at least once every three years following a schedule set by DDW. Each year, the District obtains groundwater quality data from DDW for all public water systems in Santa Clara County, including water retailers and mutual water companies subject to DDW monitoring. This District uploads this data to the District database and uses it with District collected data in the annual evaluation of groundwater quality in the Santa Clara and Llagas subbasins. In 2015, the District obtained DDW water quality compliance data from 225 production wells, as shown on Figure 7-9.

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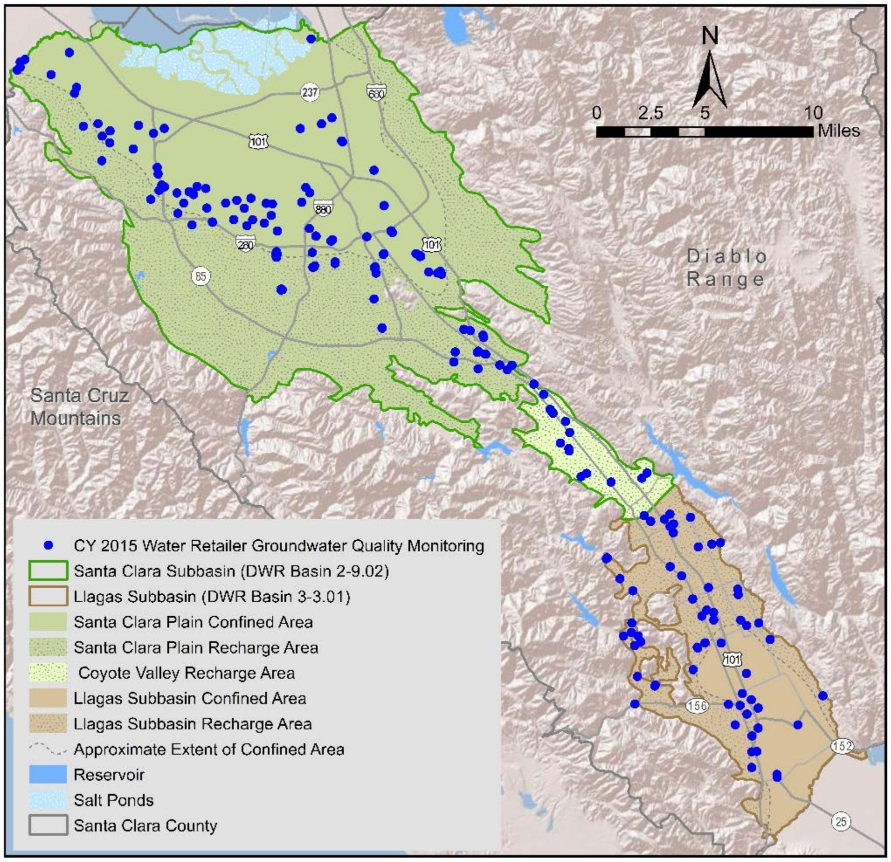
Figure 7-9. Public Water Supplier Groundwater Quality Monitoring (2015)



7.3.3 Domestic Well Testing Program

The District offers free basic water quality testing once a year to eligible domestic well owners within the District's groundwater charge zones. In 2015, the District tested more than 200 domestic wells for basic water quality parameters including nitrate, bacteria, electrical conductivity, and hardness. Domestic well data helps improve the District's understanding of the occurrence of common contaminants and helps well owners understand their well water quality. Because it is a voluntary program, the wells tested vary each year. Figure 7-10 presents the locations sampled in calendar year 2015.

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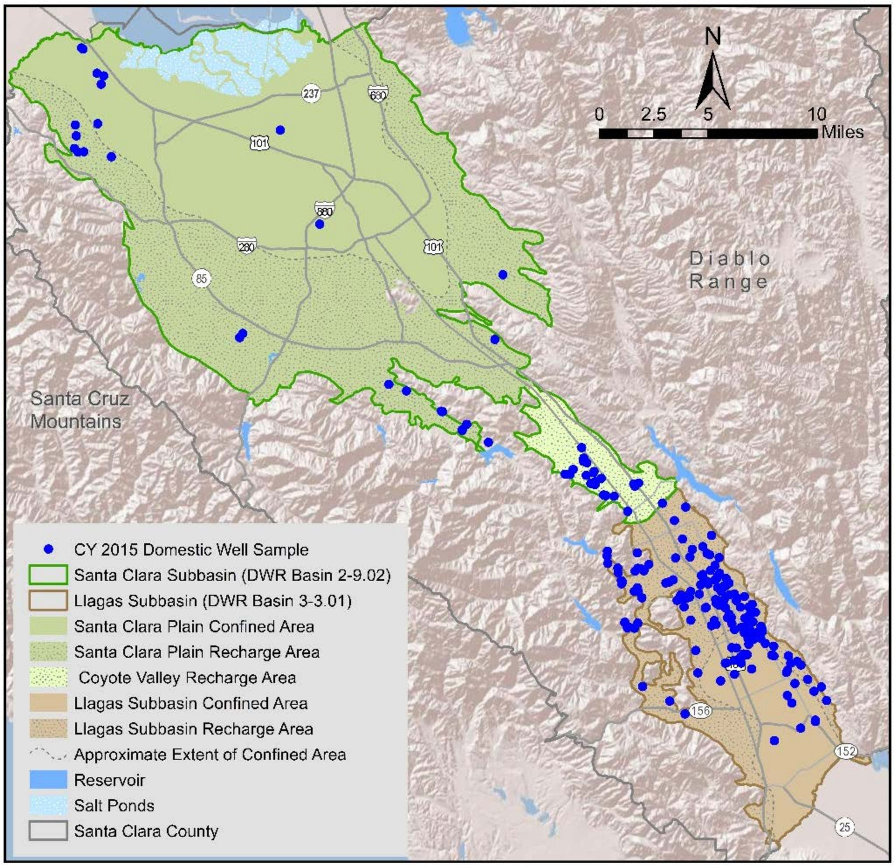
Figure 7-10. District Domestic Well Testing Locations (2015)



7.3.4 Monitoring Near Recycled Water Irrigation Sites

Tertiary-treated recycled water generally has a higher concentration of salts, nutrients, disinfection by-products, and emerging contaminants than local groundwater or treated potable water. Recycled water is used for non-potable uses like landscape irrigation, agriculture, and industry. To ensure groundwater resources are protected as recycled water use expands, the District monitors several sites in the Llagas Subbasin and the Integrated Device Technology (IDT) site in the Santa Clara Subbasin. The District also evaluates data collected by IDT and South Bay Water Recycling (SBWR) as described in this section.

7.3.4.1 District Recycled Water Irrigation Site Monitoring Network and Frequency

Following completion of the Recycled Water Irrigation and Groundwater (RWIG) Study,[95] which indicated low-level detections of contaminants including perfluorochemicals (PFCs) and N-Nitrosodimethylamine (NDMA) at the IDT site, the District and IDT began collecting ongoing monitoring data. The District also monitors several sites in the Llagas Subbasin to support expanded recycled use per the South County Recycled Water Supply Master Plan Project Environmental Impact Report (EIR).[96] Figures 7-11 and 7-12 show the location of monitoring wells near sites using recycled water for irrigation.

[95] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

[96] Santa Clara Valley Water District, 2011 South County Recycled Water Master Plan Project: Environmental Impact Report.

Figure 7-11. Santa Clara Subbasin Groundwater Quality Monitoring Near Recycled Water Irrigation Sites

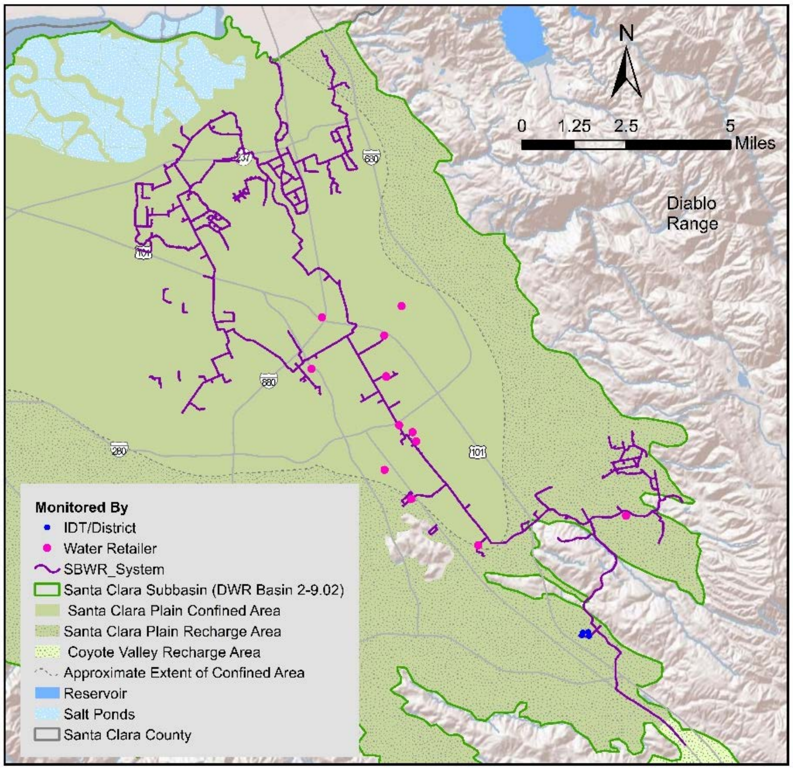
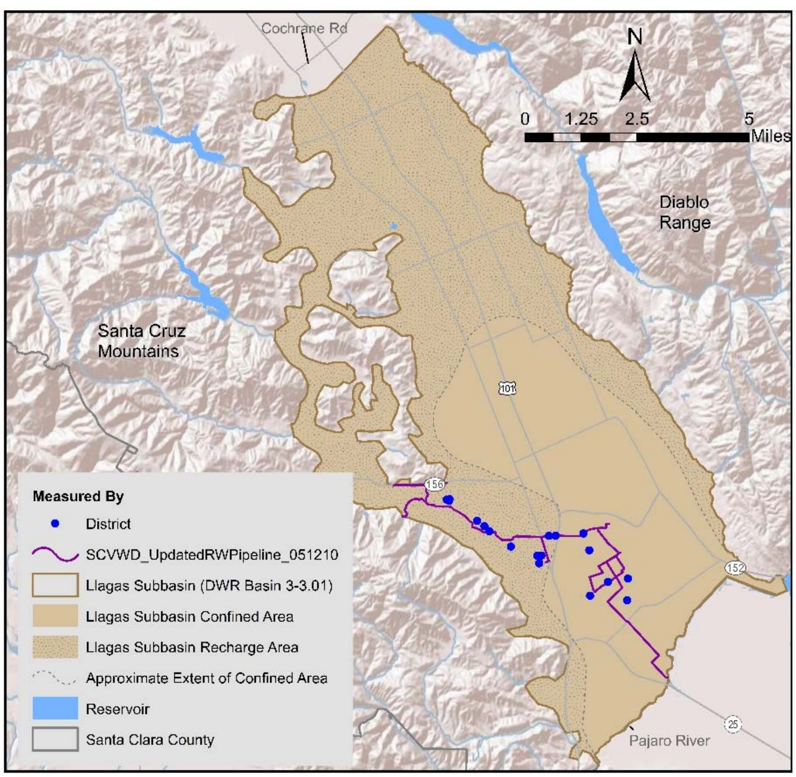


Figure 7-12. Llagas Subbasin Groundwater Quality Monitoring Near Recycled Water Irrigation Sites



Over the past few years, the District has monitored three sites where recycled water is used for irrigation, one in the Santa Clara Subbasin and two in the Llagas Subbasin. As part of recycled water expansion in the Llagas Subbasin, five new monitoring wells were added in 2014, and nine were added in 2015 to establish baseline groundwater quality prior to recycled water use. The following general guidelines were used to choose monitoring locations and design monitoring wells:

- Data collected from the monitoring wells should allow for the evaluation of water quality changes due to the use of recycled water for irrigation.
- Shallow wells (generally less than 100 feet deep) were favored for early detection of potentially adverse impacts.
- Wells within the recharge area were spaced to provide a representative sample of recycled water use and control areas.
- Within the recharge area, wells were constructed with screens at the water table and at deeper intervals Monitoring wells were constructed to provide representative samples of ambient groundwater quality.

Wells near recycled water irrigation sites are monitored quarterly. For some wells monitored, the District does not have true baseline water quality data prior to the use of recycled water for irrigation. Therefore, the data obtained reflects changes occurring after the initiation of monitoring. Once the spatial and temporal changes in water quality can be determined, the monitoring frequency may be refined. Dynamic water quality conditions might warrant more frequent monitoring whereas stable water quality may warrant a reduction in frequency. Further considerations for refining the sampling frequency will include the nature and type of contaminants observed, historical results, and trends. Appendix E presents the basic well construction details for District recycled water irrigation site monitoring wells.

7.3.4.2 District Monitoring Parameters

Parameters analyzed by the District for well and recycled water source samples are shown in Table 7-7, and are based on the District's RWIG Study recommendations. Together, these parameters have chemical characteristics that are likely to provide reliable indication of changes resulting from the use of recycled water for irrigation. The selected parameters fall into three general categories: basic water quality parameters, disinfection by-products, and other parameters of interest.

Basic water quality parameter data allows the District to determine existing quality and the geochemical make-up of groundwater at each site. If recycled water is affecting shallow groundwater, this will likely shift the geochemical make-up of shallow groundwater. Shallow groundwater is typically dominated by calcium, magnesium and bicarbonate, whereas recycled water tends to be dominated by sodium, chloride, and bicarbonate. A gradual shift in the geochemical make-up of groundwater to one in which salts dominate could suggest changes due to recycled water use.

Disinfection by-products are primarily dissolved organohalogens from the breakdown of organic substances during treatment with a chemical disinfectant. Disinfection by-products are generally harmful at low concentrations and therefore are included in this monitoring. They include parameters such as trihalomethanes, haloacetic acids, and NDMA.

The third category of parameters monitored includes those introduced as part of the influent to the wastewater treatment plant (WWTP) that may not be fully removed during treatment. These include parameters like cleaning agents, herbicides, and constituents of emerging concern. In addition, despite meeting California Title 22 reuse requirements, there are also low levels of bacteria present in recycled water.

Table 7-7. District Recycled Water Site Monitoring Parameters and Analytical Methods

Parameter	Parameter Type	Analytical Method
Boron	Basic Water Quality Parameters	EPA 6010
Calcium		EPA 6010
Magnesium		EPA 6010
Sodium		EPA 6010
Sulfate		EPA 300
Chloride		EPA 300
TDS		SM2540C
Bromide		EPA 300
Alkalinity (total)		SM2320B
Bicarbonate Alkalinity		SM2320B
Trihalomethanes (THMs)	Disinfection By-Products	EPA 8260
Halo-Acetic Acids (HAA5)		EPA 552.2
N-Nitroso Dimethylamine (NDMA)		EPA 521
Heterotrophic Plate Count	Other Parameters	SM 9215
Coliforms, Total		SM 9221
Fecal Coliforms		SM 9221
E. Coli		SM 9221
Perfluorochemicals (PFCs)		EPA 537
Ethylenediaminetetraacetic acid (EDTA)		EPA 300 (MOD)
Surfactants (MBAS)		SM 5540C
Nitrilotriacetic acid (NTA)		EPA 300 (MOD)
Perchlorate		EPA 314
Cyanide		4500CN E
Terbuthylazine		EPA 525 plus
pH	Field Parameters	Field
Temperature		Field
Oxidation Reduction Potential (ORP)		Field
Specific Conductance (EC)		Field
Total Chlorine		Field
Dissolved Oxygen (DO)		Field

MRL=Method Report Limit; ug/L= Micrograms per liter; mg/L= milligrams per liter; ng/L = nanograms per liter; CFU= Colony-Forming Units; MPN= Most Probable Number; us/cm = microsiemens per centimeter

THMs include: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

HAA5 include: Monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.

PFCs include: Perfluorooctanesulfonate (PFOS), perfluorooctanoate (PFOA) and perfluoro butanoic acid (PFBA).

7.3.4.3 Other Monitoring Near Recycled Water Irrigation Sites

The City of San Jose's SBWR Program conveys recycled water from the San Jose/Santa Clara Water Pollution Control Plant to numerous sites within the Santa Clara Subbasin. As a Water Board condition to implement this program, SBWR implemented the Groundwater Mitigation and Monitoring Plan (GMMP). As part of the GMMP, SBWR monitors groundwater quality in both the confined and recharge areas. The City of San Jose began groundwater quality monitoring in 1997 and recycled water deliveries in the area began in 1998. SBWR currently monitors six deep water supply wells in the confined area and six shallow monitoring wells in the confined and unconfined areas (Figure 7-11).

SBWR analyzes inorganic parameters such as nitrate and TDS. Initially, sampling was conducted on a monthly, then quarterly basis. As of 2006, sampling was reduced to an annual event which occurs during the first quarter of the year. SBWR provides the annual data to the District to assist in water quality analysis.

7.3.5 Groundwater Quality Monitoring Programs by Other Agencies

The sections below discuss groundwater monitoring performed by agencies other than the District, water retailers, or SBWR within the Santa Clara and Llagas subbasins. The District does not typically use this data for annual basin evaluation and reporting, but considers related findings as they become available.

7.3.5.1 GAMA

The Groundwater Ambient Monitoring and Assessment (GAMA) program was created by the Groundwater Quality Monitoring Act of 2001, with the goals of improving statewide groundwater monitoring and increasing the availability of groundwater data to the public. The State Water Resources Control Board's program was carried out by the USGS and Lawrence Livermore National Laboratory (LLNL).

The statewide program uses a consistent study design in all study areas, with spatially distributed networks producing data sets that address basin scale objectives and allow incorporation into regional and statewide assessments. GAMA networks rely primarily on existing public supply wells, with other types of wells (irrigation, domestic supply, or monitoring wells) sampled as necessary to achieve the required spatial distribution. There are four projects under GAMA that have been completed:

- Priority Basin Project: This project initially focused on assessing the deep groundwater resource that accounts for over 95 percent of all groundwater used for public drinking. In 2012, the assessment of shallow aquifer water quality was initiated to provide information on aquifers used for domestic and small community water supplies. Areas of the state with the greatest densities of households that rely on domestic wells are prioritized into study units for this phase of the project.
- Geo Tracker GAMA: Geo Tracker GAMA is an on-line database providing water quality data from various sources on an interactive Google-based map. The goal of this system is to provide a centralized system that is available to the public and decision makers.
- Domestic Well Project: The Domestic Well Project collects samples from private wells on a county level. This program is offered free to well owners who volunteer. The water quality data is placed on GeoTracker GAMA without well owner identification.
- Special Studies Project: The Special Studies Project focuses on specific issues of concern to groundwater quality. These studies provide better understanding of groundwater contaminant occurrence, fate and transport.

As a special studies project, LLNL conducted a vulnerability assessment that included Santa Clara County.[97] The Santa Clara Subbasin is included in the San Francisco Bay Study Unit and was last studied in 2007.[98] The Llagas Subbasin is part of the South Coast Interior Groundwater Basins Study Unit and was last studied in 2008.[99] Reports for the State Water Resources Control Board's GAMA investigations including the Santa Clara and Llagas subbasins are available online.

7.3.5.2 Irrigated Lands Program

The State Water Board created the Irrigated Lands Regulatory Program (ILRP) in 2003 to protect state waters from impairment by waste discharge from commercially irrigated lands, which may contain wastes, such as pesticides, nitrates, and pathogens. The ILRP requires all growers to provide a farm evaluation and a nitrogen management plan to identify improvements that can be implemented to protect water quality. Growers will be required to have a certified nitrogen management plan if their groundwater is impacted by or susceptible to impacts from nitrate, pesticides or other agricultural constituents.[100]

The ILRP for the Llagas Subbasin is overseen by the Central Coast Water Board. In 2012, the Central Coast Water Board issued a Conditional Waiver of Waste Discharge Requirements that applies to owners and operators of irrigated land used for commercial crop production. The Central Coast Water Board is focusing on priority water quality issues, such as pesticides and toxicity, nutrients, and sediments, with heavy emphasis on nitrate impacts to drinking water sources. Growers are required to take several actions to comply with the permit, including groundwater monitoring. In the Llagas Subbasin, the Central Coast Groundwater Coalition is implementing a cooperative monitoring program.[101] Growers not participating in the cooperative are responsible for monitoring their own operations to meet Water Board requirements. Participants in cooperative monitoring programs or growers conducting individual monitoring must sample groundwater for analysis of the parameters. Sample data must be entered into the State Water Board's GeoTracker database.

7.3.6 District Groundwater Quality Monitoring Protocols

This section presents the District sampling protocols for groundwater quality monitoring. These protocols are intended to ensure consistency and produce reliable, quality assured, and representative water quality data. The District' sampling protocol is consistent with best industry practice, which includes following, where applicable, the USGS National Field Manual.

7.3.6.1 District Groundwater Quality Sampling Methodology

Well purging removes stagnant water from the well prior to sample collection to allow collection of water quality samples that are representative of the aquifer. When sampling a dedicated monitoring well, the District purges a volume of water equivalent to at least three casing volumes with a portable electric submersible pump. During purging, field measurements of pH, electrical conductivity, temperature, and turbidity are measured and recorded

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[97] Lawrence Livermore National Laboratory, California Aquifer Susceptibility, A Contamination Vulnerability Assessment for the Santa Clara and San Mateo County Groundwater Basins, 2004. http://www.waterboards.ca.gov/gama/docs/cas_llnl_santaclara_sanmateo.pdf

[98] USGS, Ground-water quality data in the San Francisco Bay study unit, 2007: Results from the California GAMA program: U.S. Geological Survey Data Series 396, 2009.

[99] USGS, Groundwater-quality data in the South Coast Interior Basins study unit, 2008: Results from the California GAMA program: U.S. Geological Survey Data Series 463, 2009.

[100] http://www.swrcb.ca.gov/water_issues/programs/agriculture/docs/about_agwaivers.pdf

[101] Northern Counties Groundwater Characterization: Salinas Valley, Pajaro Valley and Gilroy-Hollister Valley, 2015.

on field data sheets. Monitoring wells generally have turbidity levels of 10 NTU or lower. When higher turbidity is encountered, the well is pumped longer to determine if lower turbidity can be obtained, and if not, samples for inorganic analytes are filtered in the lab prior to analysis.

The District samples domestic wells by letting well water run through a designated sampling port for at least 5 minutes of continuous pump operation. Since domestic wells are operated frequently, the water in the well is not stagnant, so there is no need to remove a specific volume of water during purging. If a domestic well has sat idle for a month or more, the District performs standard purging procedures.

After the required purging has been performed and field parameters have stabilized, the District collects samples in pre-cleaned and prepared sample bottles, which contain preservatives when required by the analytical method. When sampling for bacteria, the outside portion of the sampling port is first cleaned with alcohol and then samples are placed in a secondary container and stored in wet ice. All non-bacteria samples are transported in coolers with enough ice to chill samples to 4 degrees C prior to arrival at the laboratory. All samples collected by the District are recorded on standard chain-of-custody documents.

Decontamination of portable pumps used for sampling is performed under certain circumstances, which trigger action as shown in Table 7-8. In general, full decontamination with strong detergent is only performed under rare circumstances since the District primarily monitors the potable water supply aquifer as opposed to wells located at or near contaminated sites. This provides a more streamlined and efficient decontamination procedure and protects equipment from corrosive conditions while still minimizing the likelihood of contaminant transfer between well sites.

Table 7-8. Equipment Decontamination Levels

Decontamination Level	Description	Triggers
Level 1	Complete scrubbing of portable pump apparatus with 2% Alconox solution Circulation of detergent solution through internal pump assembly Complete rinsing with de-ionized (DI) water	After a long period of storage (> 6 months) After encountering unusual water quality condition such as colored water, greasy or oily substances visible, known contamination After sampling sites with a high likelihood of contamination (e.g. fueling island, near chemical storage facilities, etc)
Level 2	Clean and rinse outside portable pump apparatus with DI water or municipal tap water Rinse internal pump assembly with DI water or municipal tap water Clean and rinse first 5 feet of pump discharge line	After sampling water with high TDS (EC > 5,000 uS/cm) After high nitrate encountered (> 250 mg/L as nitrate)
Level 3	Clean and rinse outside of portable pump assembly with DI water or municipal tap water Clean and rinse first 5 feet of pump discharge tubing.	If dirt, mud, dried mineral salts, scum or film are visible on outside of pump assembly

7.3.6.2 Laboratory Analysis and Data Validation

Nearly all samples collected by the District are analyzed by the District's water quality laboratory, which is certified under the State of California Environmental Laboratory Accreditation Program. Samples are delivered to the laboratory in the appropriate condition and are accompanied by standard chain-of-custody forms. Samples for metal analyses are filtered and preserved after they are delivered to the laboratory when turbidity is over 1 NTU.

The laboratory commonly performs three types of Quality Control (QC) checks consisting of blank spike, matrix spike, and matrix spike duplicates to determine laboratory precision and accuracy. Precision refers to the closeness of agreement of multiple measurements of the same quantity and accuracy refers to the closeness of a measurement with a known or true quantity. Blank spikes are samples created by adding a known amount of "spike" chemical to a known quantity of laboratory grade de-ionized water. The concentration of the spike sample is therefore known and results of measurements can be compared against the true amount present in the sample. Matrix spikes are created like blank spikes, but a sample of groundwater from the study area is used instead of de-ionized water. Any interferences resulting from other constituents present in the groundwater "matrix" can be detected. Matrix spike duplicates are run by the laboratory to determine and report analytical precision of measurements conducted on samples with a close resemblance to actual field samples.

In addition to reviewing the laboratory QC results, sampling results are compared to the range of past results. If there are QC issues or the result appears to be an outlier when compared to historic results, the following actions may be taken:

- If sufficient sample volume is available, the laboratory may re-analyze the sample.
- The well may be re-sampled.
- If the result is determined to be invalid, it may be discarded and not used in data analysis.
- The results may be retained and used for data analysis.

The specific action taken is dependent upon the specific results and is considered on a case-by-case basis.

7.3.6.3 Data Management

Data generated by the various District monitoring programs are quality assured prior to being stored in the database. The quality assurance (QA) procedure includes verifying that the lab QA/QC meets established standards, that the data is consistent with prior samples from the same well, and where deviations occur, that the data was collected and handled properly. Validated, approved data is transferred to a multi-user District database that allows for secure storage and 'read-only' privileges for data users. Data that does not meet standard laboratory QA/QC criteria is retained in the database with a flag to indicate data quality issues. Actual hard copy laboratory reports are scanned into electronic format and placed into an electronic document archival system with key identifiers that allow easy retrieval. Data are made available upon request in standard spreadsheet format. Because the District's access agreements with some private well owners do not provide for public release, some information has to be summarized or obscured prior to release.

7.4 SURFACE WATER MONITORING

This section describes District recharge water quality monitoring and stream-gauging, as well as surface water monitoring efforts by other agencies.

7.4.1 District Recharge Water Quality Monitoring

The purpose of the District's recharge water quality monitoring is to assess the quality of water used for managed recharge at District facilities and whether changes to existing monitoring programs or recharge operations are necessary to protect groundwater. Recharge facilities receive local runoff and/or imported water, and may be susceptible to contamination from nearby land uses. The District monitors the water quality at its recharge facilities (percolation ponds and managed reaches of creeks) on a rotating schedule.

7.4.1.1 Monitoring Locations and Frequency

Monitoring is performed during both the wet and dry season, with a rotating schedule designed to sample each major recharge system at least once every three years. Monitoring locations are depicted below on Figure 7-13 and 7-14, with the recommended frequency for sampling each recharge system in Table 7-9.

7.4.1.2 Monitoring Parameters

Monitoring parameters were selected based on the program's objective to characterize water quality in the groundwater recharge facilities and to identify parameters that may impact groundwater quality. Parameters monitored include basic water quality parameters and organic compounds.

Basic water quality parameters, including inorganic water quality parameters, allow for determination of recharge water quality at each selected site. Ongoing monitoring helps identify any changes in water quality or potential adverse impacts to groundwater quality. Measured field parameters also help to identify potential changes to groundwater quality from recharge activities.

Some of the more commonly detected organic compounds in surface waters include herbicides and pesticides, while VOCs are less commonly detected. Some creeks in the Santa Clara County have been identified by the State Water Resources Control Board as impaired water bodies due to the presence of certain pesticides.[102] Herbicides, pesticides, and VOCs present a greater risk to groundwater contamination at recharge facilities due to high soil permeability.[103] The sites with the greatest potential for highway, industrial and commercial facility runoff will be monitored for VOCs since these are the likely source for introducing these constituents.

7.4.1.3 Monitoring Protocols

Prior to collecting samples, the District measures 3 to 4 sets of field parameters including temperature, dissolved oxygen, pH, and electrical conductivity at the water's edge and records related data. Stream width and depth are also measured and recorded, if safely possible, or otherwise are estimated. Afterwards, samples are collected from the 1-foot depth horizon by inverting the sample bottle and submersing it below the surface approximately 1 foot and then returning the bottle to the upright position allowing it to fill while minimizing entry of floating debris into the sample container. Prior to filling sample containers, each is tripled rinsed with the water intending to be sampled.

If access to the water's edge is difficult, a telescopic pole with a 500 milliliter cup attached to the end is used to

[102] State Water Resources Control Board, Total Maximum Daily Load Program: California's 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments, www.waterboards.ca.gov.
[103] USEPA, Potential Groundwater Contamination from Intentional and Unintentional Stormwater Infiltration, 1994; and Burton, G. and Pitt, R., Stormwater Effects Handbook, 2002.

collect samples, which are then quickly decanted into the proper sample containers. The cup is inverted as with a regular sample container prior to submersion to obtain a sample from the approximate 1-foot depth interval.

7.4.1.4 Recharge Water Quality Data Management

Data generated by this program are first quality assured then transferred electronically to a multi-user database that allows for secure storage and 'read-only' privileges for users. Actual hard copy laboratory reports are scanned into electronic format and placed into a document archival system with key identifiers to allow easy retrieval.

7.4.1.5 Recharge Reporting and Communication

Data from this program reflects the quality of water contained in the raw surface water used for recharge, which is not subject to drinking water standards and may differ considerably from drinking water obtained from wells. Data collected is evaluated and reported in the District's Annual Groundwater Report.

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Figure 7-13. Location of District Recharge Water Quality Sampling Locations in Santa Clara Subbasin

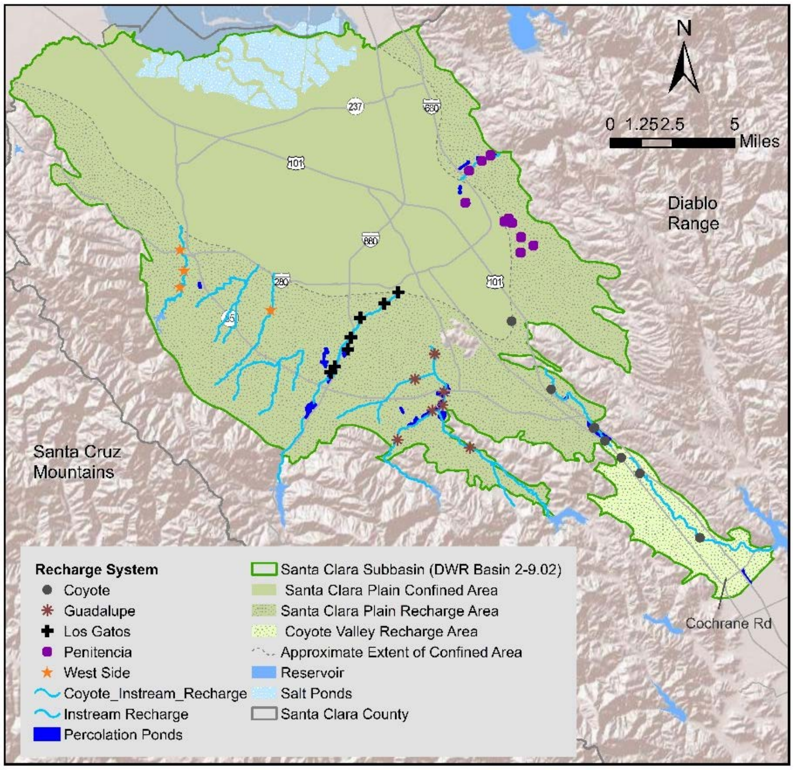

Figure 7-14. Location of District Recharge Water Quality Sampling Locations in Llagas Subbasin

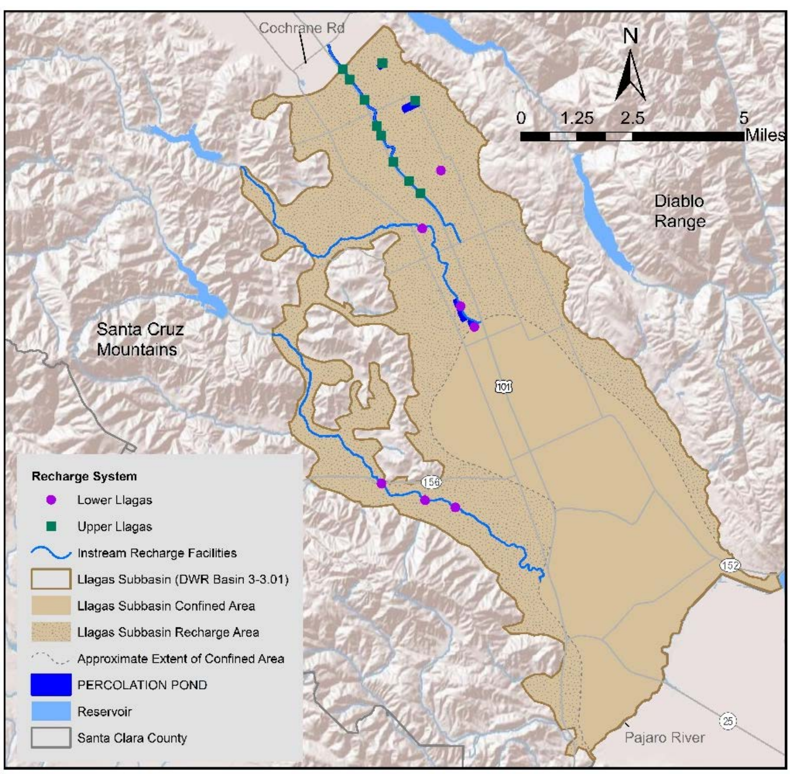

Table 7-9. Recharge Water Quality Monitoring Schedule

Recharge System	Number of Samples per System	No. of seasonal events		Total	Year 1	Year 2	Year 3
		Dry event	Wet event				
Coyote Recharge System	8	1	2	**24**		24	
Guadalupe Recharge System	4	1	2	**12**			12
Los Gatos Recharge System	6	1	2	**18**	18		
Upper Llagas Recharge System	3	1	2	**9**	9		
West Side Recharge System	3	1	2	**9**		9	
Penitencia Recharge System	3	1	2	**9**			9
Lower Llagas Recharge System	3	1	2	**9**			9
				Total	**27**	**33**	**30**

7.4.2 Surface Water Flow Monitoring

The District measures surface water stage and flow rates in streams and channels to ensure that recharge facilities are receiving appropriate flows, to comply with water rights reporting and reservoir restrictions, and to meet environmental requirements. Surface water flow data also helps the District evaluate groundwater interaction with surface water as described in Section 6.3. Real-time and archived stream gauging data is available on the District's website.[104] Stream gauging locations are presented in Figures 7-15 and 7-16.

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[104] Santa Clara Valley Water District, ALERT System Real-Time Data: http://alert.valleywater.org/

Figure 7-15. Santa Clara Subbasin Stream Gauging Locations

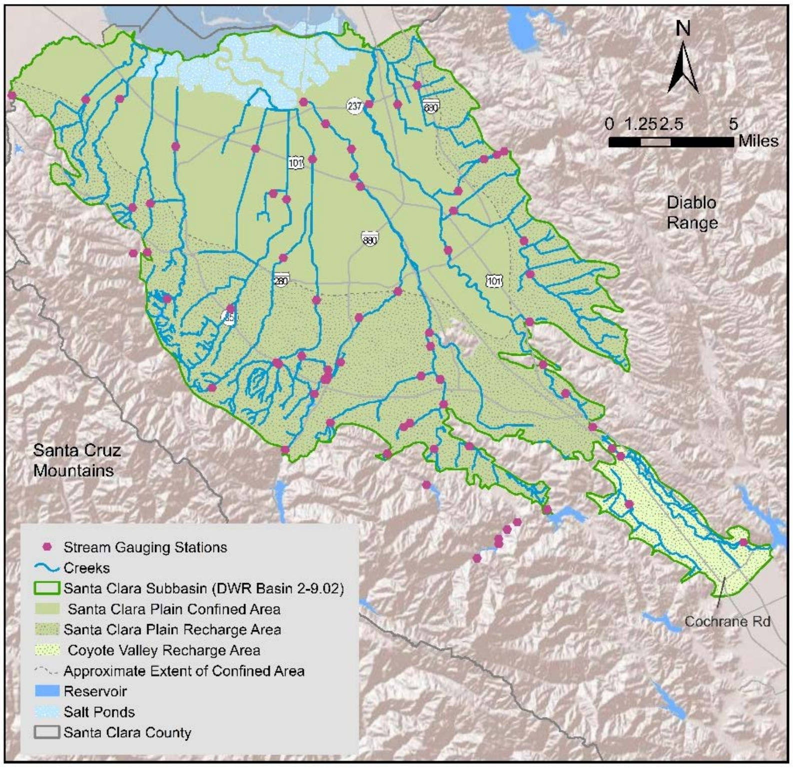
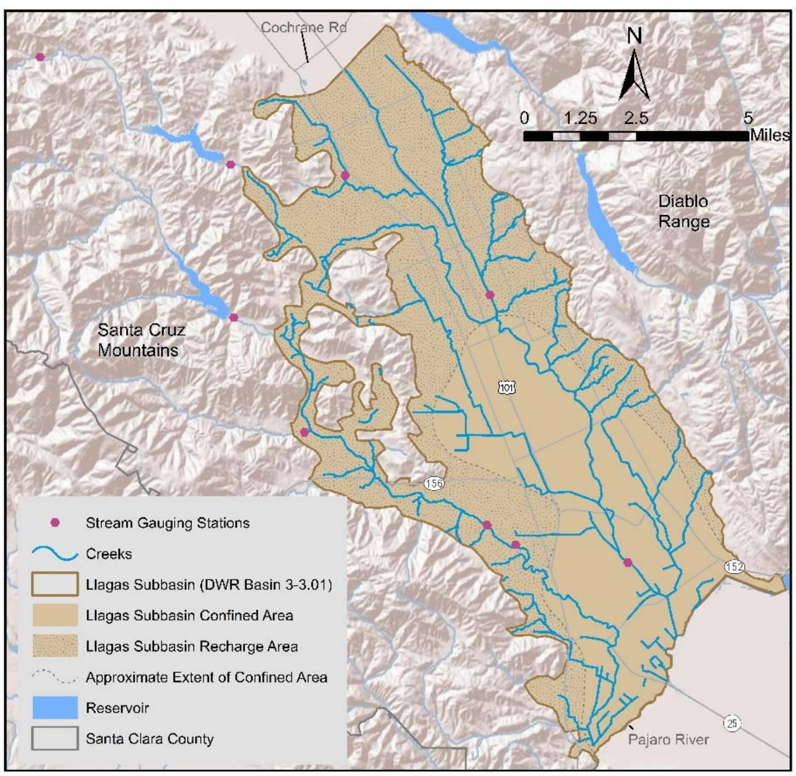


Figure 7-16. Llagas Subbasin Stream Gauging Locations



7.4.3 Surface Water Quality Monitoring by Other Agencies

Other agencies conducting surface water quality monitoring in Santa Clara County include the Central Coast Water Board and the Silicon Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as described below.

7.4.3.1 Central Coast Ambient Monitoring Program

The Central Coast Ambient Monitoring Program (CCAMP) is the Central Coast Water Board's regional water quality monitoring program. The CCAMP program aims to collect, assess, and disseminate water quality information to aid decision makers and the public in maintaining and promoting good water quality within the Central Coast region.

CCAMP maintains permanent monitoring sites that provide a framework for trend analysis and detection of emerging water quality problems. CCAMP monitors a suite of 33 sites on an ongoing basis, and rotates through an additional 30 sites annually in five watershed areas. The program design includes monthly monitoring for standard water quality parameters and flow (where accessible). Other approaches may be used at some sites based on funding and hydrogeomorphological considerations or special interest (such as known discharges or existing TMDLs).[105]

7.4.3.2 Santa Clara Valley Urban Runoff Pollution Prevention Program

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is an association of fifteen agencies that share a common permit to discharge stormwater to South San Francisco Bay. Member agencies include the District, Santa Clara County, and the 13 individual cities in northern Santa Clara County. The permit is granted under the National Pollutant Discharge Elimination System (NPDES) Municipal Regional Permit (MRP).

The SCVURPPP goal is to maintain and improve, wherever possible, the quality of stormwater discharged to natural waterways throughout the county. SCVURPPP includes construction site control, illicit discharge control, municipal operations, and water quality monitoring.

Between 2002 and 2008, the SCVURPPP Water Quality Monitoring and Watershed Assessment Program collected and analyzed screening-level water quality monitoring data from 73 creek sites located within 11 of the 13 watersheds found in the Santa Clara Basin. Water samples were analyzed for conventional water quality parameters, chemical pollutants (metals and organic contaminants), aquatic toxicity, and pathogen indicators. The SCVURPPP Water Quality Program is conducted to achieve specific objectives and is not carried out continuously. Additional creek monitoring efforts are planned, with updates available on the SCVURPPP website.[106]

7.5 REPORTING AND DATA AVAILABILITY

Monitoring data provides the basis for numerous District programs, projects, and management decisions, including annual water supply operations and long-term water utility planning. Data collected by the District is made publicly available on the District website[107] through several regular publications as shown in Table 7-10 below. Water level data is also available on-line at https://gis.valleywater.org/GroundwaterElevations/

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[105] Central Coast Ambient Monitoring Program: http://www.ccamp.org/ccamp/ccampa3.htm
[106] Santa Clara Valley Urban Runoff Pollution Prevention Program: http://www.scvurppp-w2k.com
[107] Santa Clara Valley Water District: http://www.valleywater.org

Table 7-10. Groundwater Reports

Report	Frequency of Publication	Contents
Water Tracker	Monthly	Overview of current water supply conditions, including high-level summary of groundwater levels, estimated pumping and managed recharge.
Monthly Groundwater Condition Report	Monthly	More detailed information on current groundwater levels, estimated pumping, and managed recharge to supplement the monthly Water Tracker.
PAWS Report	Annual (February)	Information on water supply and use; groundwater recharge, pumping, levels, and storage; in-lieu recharge, projected water supply availability and demand, and activities to protect and augment water supplies as required by the District Act
Annual Groundwater Report	Annual (June)	Detailed information on conditions in the Santa Clara and Llagas subbasins for the preceding calendar year, including groundwater levels, pumping, and recharge, subsidence, and groundwater monitoring results. The 2015 Annual Groundwater Report is included in Appendix C

In addition to the regular reports noted above, the District will prepare a summary annual report for submittal to DWR by April 1 as required by Water Code Section 10728. This report will contain the following information:

- Groundwater elevation data.
- Annual aggregated data identifying groundwater extraction for the preceding water year.
- Surface water supply used for or available for use for groundwater recharge or in-lieu use.
- Total water use.
- Change in groundwater storage.

7.6 GROUNDWATER MODELS

The District has developed numerical models to support operational decisions and long-term water supply planning. These include operational and water supply system models as well as groundwater flow models, which are described in this section. Currently the District maintains three numerical groundwater models. The District has developed models for the Santa Clara Plain and Coyote Valley to simulate groundwater conditions in the Santa Clara Subbasin and uses a separate model for the Llagas Subbasin (Figure 7-17). These models are used to evaluate and forecast groundwater storage and water levels under various operational and hydrologic conditions.

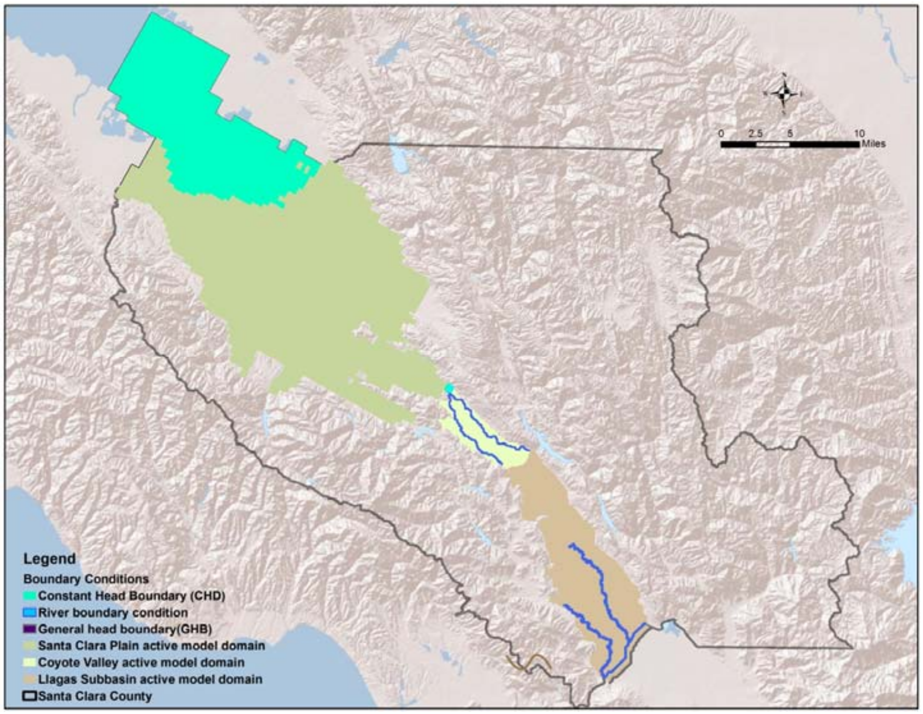
Groundwater flow models are simplified mathematical representations of complex nature systems. Models are useful tools to evaluate and forecast future groundwater conditions, but there are related limitations due to available data, simplifying assumptions, and model calibration. As articulated by George E.P. Box:[108]

[108] Box and Draper, Empirical Model-Building and Response Surfaces, 1987.

"Remember that all models are wrong; the practical question is how wrong do they have to be to not be useful." And, *"Essentially, all models are wrong, but some are useful."*

Maintaining calibrated models that can reasonably forecast groundwater conditions is an important part of the District's comprehensive groundwater management strategy.

Figure 7-17. Groundwater Flow Model Domain and Boundary Conditions



7.6.1 Santa Clara Subbasin Models

The District uses and maintains two numerical groundwater models for the Santa Clara Subbasin: one for Santa Clara Plain and the other for Coyote Valley as described below.

7.6.1.1 Santa Clara Plain Model

The Santa Clara Plain Model is a numerical model of groundwater flow in the groundwater basin of northern Santa Clara Valley.[109] The numerical model is based on the hydrogeologic conceptual model presented in the Hydrogeologic Interpretation Draft Technical Memorandum.[110] The Santa Clara Plain model uses the MODFLOW model[111] to simulate groundwater flow in the Santa Clara Plain, with the model domain extending from the Coyote Narrows (Metcalf Road) in the south to the Santa Clara-Alameda and Santa Clara-San Mateo county lines in the north. The model area encompasses most of the alluvial fill in the northern Santa Clara Valley.

The Santa Clara Plain model comprises six layers. Layers 1 and 2 represent shallow aquifers above the regional confining layer, and extend only to the confined area boundary. Layer 3 extends over the entire model domain, representing the confining layer in the center of the basin and unconfined conditions for the remainder of the domain. Layers 4, 5, and 6 represent the deeper zones of the principal aquifer, which vary in extent based on the

[109] CH2M HILL, Santa Clara Valley Groundwater Model Project, Basinwide Groundwater Flow Model, 1992a.
[110] CH2M HILL, Santa Clara Valley Groundwater Model Project, Hydrogeologic Interpretation, 1992b.
[111] McDonald and Harbaugh, A modular three-dimensional finite-difference ground-water flow model ,1988.

shape of the basin and bedrock encountered at depth. Each layer contains 57 rows and 92 columns. Active grid cells encompass an area of approximately 315 square miles. The smallest cells have a grid spacing of 1,000 feet by 1,000 feet, and the largest cells have a grid spacing of 6,000 feet by 6,000 feet. Horizontal flow boundaries include constant head and no-flow boundaries. Constant head cells are assigned to model cells that simulate San Francisco Bay and the Coyote Narrows. All other horizontal model boundaries are represented by no-flow cells.

The model uses data from 1970 to present, with a monthly stress period. The model has two major inflow components: managed recharge and natural recharge. The managed recharge occurs through nineteen percolation facilities. Natural recharge includes deep percolation of rainfall, minor un-gauged percolation from streams, mountain front recharge, water loss from transmission and distribution lines, sewer line exfiltration, and return water from agricultural and all other pumping. A constant head boundary condition at the Coyote Narrows simulates the subsurface groundwater exchange between the Coyote Valley and the Santa Clara Plain. The major outflow component is groundwater pumping. Minor outflow components accounted for in the model include evapotranspiration, sewer infiltration, and subsurface flow to San Francisco Bay (shallow layers) and aquifers beneath San Francisco Bay (deeper layers) through a constant head boundary. The initial head distribution is generated based on water level data measured during late 1969 and early 1970. The model is updated or improved when additional data becomes available.

7.6.1.2 Coyote Valley Model

In 2000, CH2M Hill developed a finite element Coyote valley groundwater model using Microfem for the Metcalf Energy Center.[112] CH2M Hill transformed the Microfem finite element model into a finite difference grid using data from mid-1987 through 1998 in 6 month increments and provided the finite difference grid model to the District. District staff made significant modifications to the CH2M Hill finite difference grid model and uses the refined model to assess groundwater conditions in the Coyote Valley.

The Coyote Valley model boundary extends from Metcalf Road at the Coyote Narrows in the north to the groundwater divide near Cochrane Road (Morgan Hill) in the south. The eastern and western boundaries are the contact between the valley fill alluvial sediments and the bedrock exposed along the edge of the valley. The finite difference model grid contains 140 rows and 150 columns, with a uniform grid spacing of 250 feet by 250 feet. The model runs on both MODFLOW 88/96 and MODFLOW 2000 using data from mid-1987 to present and a monthly time step. The model consists of four layers: three top layers representing alluvial sediments and the bottom layer representing the Santa Clara formation. The top alluvium is divided into three model layers of equal thickness to enable greater flexibility in assigning pumping and water level changes to discrete intervals or different depths within the model.

The inflow water budget components are managed recharge through Coyote Creek, areal recharge from the deep percolation of rainfall and agricultural irrigation/septic system return flows and stream seepage from upper Fisher Creek. Areal recharge at the top surface of the model is simulated using the MODFLOW Recharge package. Groundwater-surface water interactions along Coyote and Fisher creeks are simulated with stage data by the MODFLOW River package. A time-variant constant head boundary condition using the MODFLOW Constant Head package is defined at the Coyote Narrows in the north to simulate the subsurface groundwater exchange between the Coyote Valley and the Santa Clara Plain. The model has no-flow boundary conditions on the east, west, south and bottom of the model. The outflow water budget components are groundwater pumping, subsurface outflows at the Coyote Narrows, evapotranspiration from shallow groundwater areas, and gaining reaches of Fisher and Coyote creeks. Groundwater extraction from model layers 2 and 3 is simulated using the MODFLOW well package.

[112] CH2M Hill, Coyote Valley Groundwater Report, 2000.

Evapotranspiration from shallow groundwater areas are simulated using the MODFLOW Evapotranspiration package.

7.6.2 Llagas Subbasin Model

The Llagas Subbasin groundwater flow model was developed in 2005 to provide the District with a tool to support management of the subbasin.[113] The model is used to evaluate groundwater supplies using current and future demands under different hydrologic conditions.

The Llagas model was developed with a finite difference gridding method using MODFLOW 2000 to assess the subbasin response to hydrologic conditions using data from the water year 1988 to water year 2002 in 6 month increments. The model currently used by the District is a revised version of the original model that runs from October 1987 to the present in one month increments. The model grid covers the main alluvial areas of the Llagas Subbasin, which extends from Cochrane Road in the north to the subbasin's southern boundary near the Pajaro River. The finite difference grid contains four active layers of 200 rows and 140 columns, with a uniform grid spacing of 500 feet by 500 feet. The model has four parallel layers that roughly coincide with the distribution of production well perforations. The bottom of Layer 1 is below the lowest water levels anticipated during simulations, and the bottom of Layer 4 is the top of the bedrock interpreted from cross-sections. The elevation and thickness of the layers are based on borehole lithology and drillers logs.

The Llagas model inflow water budget components are managed recharge to creeks and percolation ponds, natural recharge (estimated as the deep percolation of rainfall, septic return flow, and stream seepage), and subsurface inflow (from bedrock uplands, alluvial tributary canyons, and the adjacent Bolsa Subbasin). The outflow components are mainly groundwater pumping, with smaller fractions of evapotranspiration, gaining creeks, and subsurface outflows to the Bolsa subbasin. The inflow and outflow water budget components are simulated in the model using different MODFLOW 2000 packages. The Llagas model has no-flow boundaries on the east and west sides of the model, at Cochrane Road in the north, and at the bottom of layer 4. A general head boundary is set at the southern boundary to simulate the head-dependent subbasin exchange between the Llagas and Bolsa Subbasins. The top surface of the model is simulated using MODFLOW recharge, well (injection), evapotranspiration, and river packages. Extraction wells are simulated using the well package from layer 1 through 4 depending on well perforation.

7.6.3 Groundwater Storage Analysis

Groundwater provides nearly all water used in the Coyote Valley and Llagas Subbasin and is an important supply in the Santa Clara Plain. The District regularly analyzes groundwater storage to support operational decisions, contingency planning, and planning to meet future needs. To support near-term operations, the District uses groundwater models to estimate storage for the current year and simulate conditions for the following calendar year under a range of projected water supply and hydrologic scenarios. As the water year progresses and more water supply and demand information becomes available, operations plans are updated accordingly. The goal of operations planning is to ensure adequate supplies are available and groundwater resources are protected. Projected end of year groundwater storage is the key trigger for the District's Water Shortage Contingency Plan, which recommends increased short-term water use reduction measures as groundwater storage declines.

Groundwater models are also used to support long-term water planning efforts such as the Urban Water Management Plan and Water Supply Master Plan and individual projects. Understanding groundwater conditions under various pumping and hydrologic scenarios supports the analysis of the potential impacts of various projects, or when and where additional investments (such as additional recharge) may be needed.

[113] CH2MHill, Llagas Basin Numerical Groundwater Model Report, 2005

CHAPTER 8 – NEXT STEPS

Previous chapters of this 2016 Groundwater Management Plan outlined the District's basin sustainability goals, strategies to meet those goals, related programs and activities, and key outcome measures to gauge performance. This chapter describes outcome measure evaluation, potential tools to address outcome measure performance, and recommendations to ensure continued sustainability.

8.1 EVALUATION AND REPORTING OF OUTCOME MEASURES

The 2016 GWMP is based on a "Plan, Do, Check, Act" framework or model of continuous improvement:

- Identify sustainability goals and strategies in accordance with the District Act and Board policy ("Plan")
- Implement basin management programs and activities in accordance with strategies to achieve sustainability goals ("Do")
- Conduct monitoring, analyze results, and compare to outcome measures ("Check")
- Modify existing programs or evaluate and develop new strategies and tools if outcome measures indicate improvement is needed ("Act")

The outcome measures presented in the 2016 GWMP will be evaluated on an annual basis and presented in the District's Annual Groundwater Report, which will also include recommendations for action as needed. The District will review and update the GWMP as needed, but at least every five years. This will ensure compliance with SGMA requirements for Alternatives, and provide current groundwater management information to support five-year updates of the Urban Water Management Plan as required by State law.

8.2 ADDRESSING OUTCOME MEASURE PERFORMANCE

Significant investments in conjunctive water management, close coordination with water retailers, and careful planning have allowed Santa Clara County to overcome historical undesirable results and achieve sustainable groundwater conditions. The District's approach to groundwater management has evolved over many decades in response to numerous challenges, and this adaptive approach will help meet future water supply challenges to ensure continued groundwater sustainability.

If evaluation of the outcome measures indicates a need for improvement, the District will first assess potential changes to existing programs and activities prior to considering significant groundwater management changes. Any significant policy or investment decisions would be developed and evaluated in coordination with other District planning efforts and in consultation with water retailers and local stakeholders, as the District does in current planning and budgeting processes.

8.2.1 Groundwater Supply Reliability

Maintaining reliable groundwater supplies helps meet community water needs and avoid undesirable results such as long-term overdraft, land subsidence, and salt water intrusion. Countywide water supplies are generally sufficient to meet demands in normal years through 2040, but significant shortages may occur during multiple dry years without additional investments.[114] In addition, there are certain risks that could change the water supply outlook, and further impact the District's ability to maintain sustainable groundwater supplies. These challenges include increased demands beyond what is projected, constraints on Delta exports, and climate change.

[114] Santa Clara Valley Water District, Urban Water Management Plan, 2015.

The District plans to update its Water Supply Master Plan in 2017. As part of the planning process, the District will evaluate supply projects and programs to minimize projected future shortages and ensure continued water supply reliability and groundwater sustainability. These projects and programs may include additional long-term water conservation, water recycling, recharge capacity, stormwater capture and reuse, banking, and storage. Water Supply Master Plan implementation will be staged to minimize the risk of stranded investments or under-investment should demands not increase as projected.

Existing groundwater management tools for ensuring groundwater reliability include:

- Implementation of managed recharge and groundwater pumping offsets through in-lieu recharge programs;
- Cooperation with water retailers on source shifts and shortage response;
- Coordination with water retailers and land use agencies on General Plans, Urban Water Management Plans, and water supply assessments.

Potential groundwater management tools that could also be considered to ensure sustainable groundwater supplies include:

- Creation or modification of groundwater charge zones;
- Changes to the groundwater charge rate structure;
- Changes in the District's well permitting process;
- Institutional agreements with water retailers related to groundwater management;
- Regulation of groundwater pumping if groundwater is endangered and regulation is necessary to avoid permanent damage in the form of diminution, contamination, pollution, or land subsidence.

While the regulation of pumping may be needed to address undesirable results like chronic overdraft, land subsidence, or groundwater quality impacts, related SGMA authorities have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with District regulation of pumping at individual wells must be carefully considered. As described in Chapter 1 and the recommendations below, the District plans to work with water retailers and other interested stakeholders to evaluate these potential authorities.

8.2.2 Groundwater Quality Protection

Challenges to protecting groundwater quality include intensified land use, emerging contaminants, and more stringent regulatory standards. The District does not control land use or deliver groundwater directly to customers, so protecting groundwater quality requires coordination with water retailers, land use agencies, regulatory agencies, and the public.

Existing groundwater management tools to protect groundwater quality include:

- Coordination with regulatory agencies overseeing high-threat contaminant release sites to ensure adequate cleanup;
- Coordination with local land use agencies on water supply assessments, land use proposals, stormwater infiltration devices, septic systems, and small water systems served by wells;
- Outreach to domestic well owners on well maintenance, and water quality issues like nitrate;
- Rebates for point-of-use treatment to reduce private well owner exposure to elevated nitrate.

Activities that can be considered to improve groundwater protection include:

- Increased coordination with regulatory agencies to ensure high-threat contamination is promptly and adequately addressed;
- Expanded outreach efforts to raise awareness of groundwater protection, including outreach to agricultural users in coordination with local partners and the Central Coast Water Board;
- Coordination with local land use agencies and others to develop guidelines or best management practices related to specific threats;
- Expanded efforts with legislators and others to target significant threats and fund regulatory efforts;
- Enhanced managed recharge programs to further dilute contaminants;
- Re-initiation of the District's abandoned well destruction assistance program to address vertical conduit threats;
- New groundwater protection ordinance or regulatory solutions, if needed to protect groundwater quality.

8.3 GROUNDWATER MANAGEMENT PLAN RECOMMENDATIONS

The District's proactive groundwater management programs and activities have maintained sustainable groundwater levels and storage, minimized land subsidence, and improved groundwater protection. To maintain the long-term viability of groundwater resources, the following actions are recommended:

1. **Maintain existing conjunctive water management programs and evaluate opportunities for enhancement or increased efficiency.**

   Programs to recharge groundwater through direct replenishment and in-lieu recharge maintain groundwater levels and flow gradients and are essential to prevent groundwater overdraft, land subsidence, and salt water intrusion. Priorities include efforts to:

   a. Ensure the reliability of the District's water utility infrastructure, including local dams and reservoirs, diversion structures, pipelines, pumping stations, treatment plants and managed recharge facilities through appropriate maintenance or replacement.

   b. Implement high-priority capital projects that support conjunctive water management, including indirect potable reuse and dam seismic stability projects.

   c. Secure local and imported sources of supply, including a long-term solution for reliable Delta conveyance.

   d. Maintain and expand in-lieu recharge programs to offset pumping, including treated water sales, water recycling and water conservation, to reduce demands on the groundwater subbasins.

   e. Encourage water retailers to maintain other water supply sources, including San Francisco Public Utilities Commission contract deliveries to Santa Clara County.

   f. Maintain and optimize operations activities that support conjunctive water management, including modeling, forecasting, systems control, and water accounting.

2. **Continue to aggressively protect groundwater quality through District programs and collaboration with land use agencies, regulatory agencies, and basin stakeholders.**

   A reliable water supply depends not only on quantity, but on quality. Unlike surface water, most groundwater pumped in the county does not require treatment beyond disinfection, making protection of this local resource all the more important. Priorities include efforts to:

   a. Continue to implement comprehensive programs to evaluate groundwater quality conditions so potentially adverse trends can be quickly identified and appropriate action can be taken before conditions become severe.

   b. Collaborate with local partners and regulatory agencies on efforts including salt and nutrient management, stormwater management, land use and policy review, and recycled water expansion.

   c. Evaluate opportunities for expanded partnerships to maximize groundwater protection.

3. **Continue to incorporate groundwater sustainability in District planning efforts.**

   Future sustainability depends on continued, thoughtful water supply planning and investments. Priorities include efforts to:

   a. Complete the Water Supply Master Plan in 2017 to address future challenges to maintaining reliable groundwater supplies and implement related projects as appropriate.

   b. Continue to include groundwater sustainability as an important component under the District's Urban Water Management Plan and related water shortage contingency plan.

   c. Account for groundwater sustainability during the planning and implementation of multi-benefit projects under the District's One Water Plan.

4. **Maintain adequate monitoring programs and modeling tools.**

   The assessment of groundwater conditions and performance of outcome measures relies on timely, accurate, and representative data. The District has comprehensive groundwater monitoring programs and calibrated groundwater flow models, but they need to be maintained and improved. Priorities include efforts to:

   a. Identify gaps and redundancies in existing monitoring networks.

   b. Secure long-term access for sustainable monitoring networks.

   c. Identify additional monitoring needed to improve assessment of basin conditions.

   d. Identify and implement modeling improvements to enhance simulation capabilities, including groundwater storage estimates.

   e. Improve understanding of surface water/groundwater interaction.

5. **Continue and enhance groundwater management partnerships with water retailers and land use agencies.**

   Continued collaboration and strong partnerships with water retailers and land use are needed to ensure future sustainability, with priorities including efforts to:

   a. Continue regular interaction with water retailers through Water Retailer meetings, including the Groundwater Subcommittee.

b. Meet regularly with South County water retailers to discuss groundwater management issues in areas dependent on groundwater.

c. Explore options for improved management of local water and San Francisco Public Utilities Commission supplies in Santa Clara County.

d. Maintain contingency plans and further develop management options for water shortages, as well as for local or Delta-related interruptions in supply.

e. Coordinate with water retailers and local land use agencies on General Plans, water supply assessments, and Urban Water Management Plans.

6. Evaluate the potential new authorities provided by SGMA.

These include the ability to regulate groundwater pumping and assess different types of groundwater charges. The District plans to evaluate these new authorities in cooperation with water retailers and other interested stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future.

a. Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary.

b. Evaluate the various fees that can be collected pursuant to SGMA, including fixed fees, to determine if they further sustainable groundwater management.

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Glossary

A

Acre-Foot
The volume of water necessary to cover one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

Alluvium
A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, as a cone or fan at the base of a mountain slope.

Aquifer
A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

Aquitard
A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores groundwater.

Artesian Aquifer
A body of rock or sediment containing groundwater that is under greater than hydrostatic pressure; that is, a confined aquifer. When an artesian aquifer is penetrated by a well, the water level will rise above the top of the aquifer.

B

Basin
A groundwater basin or subbasin identified and defined in the California Department of Water Resources Bulletin 118.

Basin Plan
The Regional Water Quality Control Board's master water quality control planning document that designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater and includes implementation programs to achieve water quality objectives.

Beneficial Use
One of many ways that water can be used either directly by people or for their overall benefit. The State Water Resources Control Board recognizes 23 types of beneficial use with water quality criteria for those uses established by the Regional Water Quality Control Boards.

Bulletin 118
The Department of Water Resources report, entitled "California's Groundwater: Bulletin 118", updated in 2003, or as it may be subsequently updated or revised.

C

CASGEM
The California Statewide Groundwater Elevation Monitoring Program developed by the Department of Water Resources pursuant to Water Code Section 10920 et seq.

Cone of Depression
In an unconfined aquifer, this is an actual depression of the water levels. In confined aquifers (artesian), the cone of depression is a reduction in the pressure head surrounding the pumped well.

Glossary

Confined Aquifer
An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined groundwater. See artesian aquifer.

Conjunctive Management/Use
The coordinated and planned management of both surface and groundwater resources to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin with available surface water supplies.

G

Groundwater
Water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

Groundwater Basin
An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

Groundwater Budget
A numerical accounting of the recharge, discharge and changes in storage of an aquifer, part of an aquifer, or a system of aquifers. The groundwater equation for mass conservation or balance for an aquifer, part of an aquifer, or a system of aquifers.

Groundwater Charge Zone
A zone in which groundwater production charges are levied to fund District activities that protect and augment groundwater supplies.

Groundwater Demand
The quantity of groundwater within the subbasin needed for beneficial use.

Groundwater Gradient
A measure of the change in groundwater head over a given distance. Groundwater flows from areas of high hydraulic head (high water level elevation) to areas of low head (low water level elevation).

Groundwater Recharge
The natural or intentional infiltration of surface water into the zone of saturation.

Groundwater Subbasin
A subdivision of a groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

Groundwater Sustainability Agency
One or more local agencies that implement the provisions of the Sustainable Groundwater Management Act. The Santa Clara Valley Water District is the groundwater sustainability agency for Santa Clara Subbasin and Llagas Subbasin.

Groundwater Sustainability Plan (GSP)
A plan of a groundwater sustainability agency proposed or adopted pursuant to the Sustainable Groundwater Management Act.

Glossary

I

Imported Water
Non-local source of water. Water is purchased from the State and Federal Water Projects and others outside the groundwater basin's geographical boundaries and transported into the basin for use as surface water or for recharge into the basin.

In-Lieu Recharge
The practice of providing surplus surface water or recycled water to historic groundwater users, thereby leaving groundwater in storage for later use. Water conservation programs also serve as in-lieu recharge by reducing demands, thereby increasing storage.

L

Land Subsidence
The lowering of the natural land surface due to groundwater extraction.

Long-Term Overdraft
The condition of a groundwater basin where the average annual amount of water extracted for a long-term period, generally 10 years or more, exceeds the long-term average annual supply of water to the basin, plus any temporary surplus. Overdraft during a period of drought is not sufficient to establish a condition of long-term overdraft if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

M

Managed Recharge
The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

Maximum Contaminant Level (MCL)
The highest drinking water contaminant concentration allowed under federal and State Safe Drinking Water Act regulations. Health based MCLs are referred to as Primary MCLS. Secondary MCLs are established for contaminants that may affect aesthetic properties of drinking water such as taste, color, and odor.

N

Natural Recharge
Natural replenishment of an aquifer, generally from runoff, through seepage from the surface.

O

Operational Storage
The usable storage within an aquifer system or groundwater basin that accounts for the avoidance of adverse impacts. It is a dynamic quantity that must be determined from a set of alternative groundwater management decisions subject to goals, objectives, and constraints of the groundwater management plan.

Outcome Measures
Specific, quantifiable goals for the maintenance or improvement of the specified groundwater conditions included in the Plan to achieve the sustainability goal for the basin.

P

Potable Reuse

The use of recycled water as part of the potable water supply. Indirect potable reuse is the use of highly treated recycled water for managed recharge, which provides natural filtration and blending with groundwater prior to its reuse as a potable supply. Direct potable reuse is the direct delivery of highly purified recycled water to the potable water supply.

Public Water System

As defined in Section 116275 of the Health and Safety Code, a public water system is a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. A public water system includes the following:

(1) Any collection, treatment, storage, and distribution facilities under control of the operator of the system that are used primarily in connection with the system.

(2) Any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system.

(3) Any water system that treats water on behalf of one or more public water systems for rendering it safe for human consumption.

R

Recharge Area

The area that supplies water to an aquifer in a groundwater basin.

S

Salt Water Intrusion

The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

Semitropic Groundwater Bank

Long-term water storage project designed to optimize the distribution and use of water resources between the Semitropic Groundwater Bank and its banking partners, like the District. Semitropic receives SWP or CVP surface water from its banking partners in years of ample supplies and delivers it to landowners in Kern County for irrigation use in lieu of groundwater pumping. Groundwater which otherwise would have been pumped remains in storage, credited to the account of the banking partner. In times of surface water shortages, the water may be withdrawn and used by Semitropic or other downstream users in exchange for an equal amount of water conveyed to the District from the Sacramento-San Joaquin Delta.

Sustainable Groundwater Management Act (SGMA)

Legislation signed into state law in 2014 with the intent for groundwater to be managed sustainably in California's groundwater basins by local public agencies and newly-formed groundwater sustainability agencies.

Sustainable Yield

As defined in SGMA (Water Code Section 10721), the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.

U

Unconfined Aquifer

An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

Undesirable Result
As defined in SGMA (Water Code Section 10721), an undesirable result is one or more of the following effects caused by groundwater conditions occurring throughout the basin:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
2. Significant and unreasonable reduction of groundwater storage.
3. Significant and unreasonable seawater intrusion.
4. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
5. Significant and unreasonable land subsidence that substantially interferes with surface land uses.
6. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Urban Water Management Plan (UWMP)
An UWMP is required for all urban water suppliers having more than 3,000 connections or supplying more than 3,000 acre-feet of water. The plans include discussions on water supply, supply reliability, water use, water conservation, and water shortage contingency and serve to assist urban water suppliers with their long-term water resources planning to ensure adequate water supplies for existing and future demands.

W

Water Budget
An accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored. See groundwater budget.

Water Year
The period from October 1 through the following September 30, inclusive.

Wellhead Protection Area
The surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field.

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Appendix A – Board Action and GWMP Outreach

A1. Board Agenda Item and Resolution to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

A2. Board Resolution to Adopt the 2016 Groundwater Management Plan and Related Agenda Item (Includes Public Comment Letters Received)

A3. District Response to Public Comment Letters on the Draft GWMP

A4. GWMP Outreach – Public Notices

A5. GWMP Outreach – Letter to Interested Stakeholders

A6. GWMP Outreach – List of Meetings Where the GWMP was Discussed

A7. GWMP Outreach – District Website Information

A8. Environmental Documentation

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Appendix A – Board Action and GWMP Outreach

A1. Board Agenda Item and Resolution to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

Santa Clara Valley Water District

Santa Clara Valley Water District

CONFORMED COPY

File No.: 16-0304

Agenda Date: 5/24/2016
Item No.: 2.7.

BOARD AGENDA MEMORANDUM

SUBJECT:
Public Hearing and Resolution on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins.

RECOMMENDATION:

A. Conduct the public hearing on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins;
B. Adopt the Resolution DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE SANTA CLARA AND LLAGAS SUBBASINS; and
C. Authorize the Interim Chief Executive Officer or designee to submit the resolution and a Notice of Intent to the California Department of Water Resources (DWR).

SUMMARY:
The Sustainable Groundwater Management Act (SGMA) was enacted by the state legislature in 2014 to ensure sustainable management of groundwater in California. For basins designated as high or medium priority by the state, SGMA requires the identification of a local agency that will manage the basin by June 30, 2017. This could be a local agency with statutory authority to manage groundwater or a Groundwater Sustainability Agency (GSA). SGMA designates the Santa Clara Valley Water District (District) as the exclusive local groundwater management agency within its statutory boundary, which coincides with Santa Clara County. SGMA provides GSAs with access to various powers and authorities to ensure sustainable management.

The Santa Clara and Llagas Subbasins in Santa Clara County are medium and high priority basins, respectively (Attachment 1), and are subject to SGMA requirements. For many decades, the District has sustainably managed these subbasins through authorities provided by the District Act. The District's comprehensive groundwater management strategy and programs are described in the 2012 Groundwater Management Plan, which was adopted by the District Board of Directors.

This public hearing is being held pursuant to Water Code Section 10723, and provides an opportunity for any interested person to provide comments on the District decision to become the GSA for the Santa Clara and Llagas Subbasins. Staff recommends that the Board adopt the

ADOPTED
MAY 24 2016

resolution to decide to become the GSA for the Santa Clara and Llagas Subbasins (Attachment 2). This action will confirm the District's role as the local groundwater management agency, ensure access to SGMA authorities, and preserve access to funding or other opportunities that may be limited to GSAs. Staff also recommends that the Board authorize the Chief Executive Officer or her designee to submit the resolution and required Notice of Intent to DWR.

Background

Management of Santa Clara County's groundwater resources is critical to support Silicon Valley's vibrant economy. Groundwater provides nearly half the water used in the county and is the sole drinking water source in South County. About 150,000 acre-feet of groundwater is pumped annually, far exceeding the amount naturally replenished. The Santa Clara and Llagas Subbasins transmit, filter, and store huge quantities of water and serve as the county's best protection against drought or extended system outages.

The District was formed in 1929 to address unsustainable groundwater pumping and related effects, including overdraft and land subsidence. While many areas of the State are observing chronic overdraft and subsidence, Santa Clara County is recognized as an area where these issues have been, and continue to be, successfully addressed through sustainable groundwater management.

Groundwater Management Authorities

The District manages the Santa Clara and Llagas Subbasins through broad statutory authority granted by the District Act to recharge groundwater basins; conserve, manage and store water for beneficial and useful purposes; increase water supply; protect surface water and groundwater from contamination; prevent waste and diminution of the District's water supply; and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses within the Santa Clara County. The District Act also allows for the creation of zones and the levy of groundwater charges to fund water supply activities within those zones.

SGMA does not affect any existing District authorities, but provides access to new tools that may be needed to ensure sustainability. Potential new authorities include the ability to restrict or allocate pumping and control well spacing or operation. Additional methods for collecting fees, including fixed or tiered fees, are also available through SGMA. The District will work closely with stakeholders prior to implementing any new authority.

Decision to Become the GSA for the Santa Clara and Llagas Subbasins

SGMA lists the District as the exclusive groundwater management agency within its statutory

boundary and no other agency can become a GSA in Santa Clara County unless the District decides to opt out of that distinction. SGMA is vague on the advantages, if any, between being an *exclusive* groundwater management agency or a GSA, including whether SGMA authorities identified for a GSA are also available to exclusive groundwater management agencies.

The staff proposal to become the GSA for the Santa Clara and Llagas Subbasins has been discussed with the Water Retailers Committee and Water Retailers Groundwater Subcommittee. The primary interest of the retailers is to be involved as the District updates its Groundwater Management Plan and considers implementation of any new authorities. The District will continue to work closely with water retailers and receive input from other interested stakeholders to ensure continued, sustainable management of local groundwater.

Staff recommends that the District decide to become the GSA for the Santa Clara and Llagas Subbasins. Although no other agency could be the GSA unless the District opts out, this action will confirm the District's role with regard to local SGMA compliance and ensure that related authorities are available if needed. This will also ensure District access to funding or other opportunities that may be limited to GSAs. Pursuant to Water Code Sections 10723 and 10723.8, the decision to become the GSA requires a public hearing, Board Resolution (Attachment 2), and submittal of a Notice of Intent to DWR.

Other Subbasins in Santa Clara County

In addition to the Santa Clara and Llagas Subbasins, Santa Clara County includes small portions of five subbasins in San Mateo, Alameda, and San Benito Counties as shown in Attachment 1. The portions of the subbasins overlapping with San Benito County are required to be managed per SGMA.

The San Mateo Plain is ranked as a very low priority basin and does not require further action under SGMA at this time. However, the District is coordinating with San Mateo County staff on their subbasin characterization efforts. Areas of overlap with Alameda County and San Benito County relating to county boundaries are being resolved through DWR adjustments.

A GSA for the medium priority Hollister and San Juan Bautista Subbasins (including the small portions in Santa Clara County) must be identified by June 30, 2017. These subbasins are primarily located within San Benito County, and the San Benito County Water District manages groundwater in their jurisdiction. The District does not conduct groundwater management activities in the Hollister or San Juan Bautista Subbasins. Staff will continue to discuss areas of overlap with the San Benito County Water District and will bring related information back to the Board by December 2016.

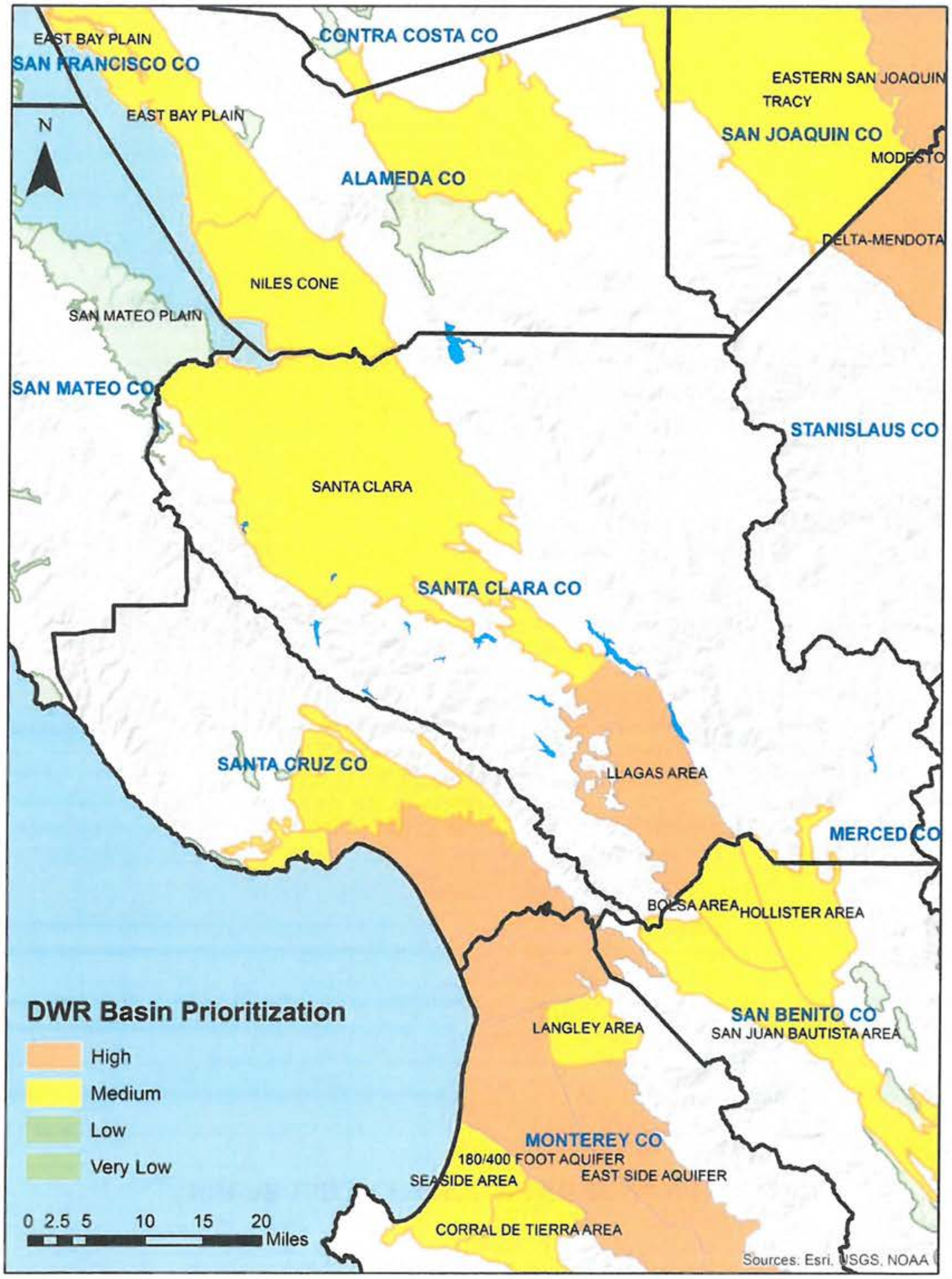
FINANCIAL IMPACT:
There is no financial impact associated with this item.

CEQA:
The recommended action does not constitute a project under CEQA because it does not have a potential for resulting in direct or reasonably foreseeable indirect physical change in the environment.

ATTACHMENTS:
Attachment 1: SC County Groundwater Subbasins Map w/DWR Basin Prioritization
Attachment 2: Resolution
Attachment 3: PowerPoint

UNCLASSIFIED MANAGER:
Garth Hall, 408-630-2750

Attachment 1 – Santa Clara County Groundwater Subbasins with DWR Basin Priority Ranking



Attachment 1
Page 1 of 1

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BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 16–51

DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE SANTA CLARA AND LLAGAS SUBBASINS

WHEREAS, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, Water Code Sections 10725 et al. and 10726 et al. detail additional new powers and authorities granted to Groundwater Sustainability Agencies to implement sustainable groundwater management in the basins under their jurisdictions; and

WHEREAS, Water Code Section 10723(c)1(M) specifically identifies the Santa Clara Valley Water District (District) as one of fifteen (15) agencies created by statute to manage groundwater that shall be deemed the exclusive local agencies within their respective statutory boundaries; and

WHEREAS, the Santa Clara Valley Water District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County; and

WHEREAS, the District's statutory boundary wholly overlies the Santa Clara Subbasin and Llagas Subbasin; and

WHEREAS, the Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore requiring the development of a Groundwater Sustainability Plan or an Alternative Plan; and

WHEREAS, establishing the District as the Groundwater Sustainability Agency will enable the District to prepare and implement an Alternative Plan for the Santa Clara and Llagas Subbasins, and to best work with DWR and the State Water Resources Control Board to resolve groundwater and surface water issues related to the Santa Clara and Llagas Subbasins; and

WHEREAS, the District is committed to its legislatively created mandate to manage the surface water and groundwater resources within its jurisdiction; and

WHEREAS, prior to adopting a resolution of intent to establish the District as a Groundwater Sustainability Agency, Water Code Section 10723 requires the local agency to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency; and

WHEREAS, pursuant to Government Code 6066, notices of a public hearing on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency were published on May 4, 2016 and May 12, 2016; and

WHEREAS, on May 24, 2016, this District held a public hearing regarding the adoption of a resolution to establish the District as the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins;

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District:

1. Hereby establishes the District as the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins; and

2. Hereby authorizes the Chief Executive Officer or her designee to provide a copy of this resolution and a Notice of Intent to the California Department of Water Resources within 30 days and to otherwise comply with the requirements of Water Code Section 10723.8(a); and

3. All the recitals in this Resolution are true and correct and the District so finds, determines, and represents.

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District by the following vote on May 24, 2016:

AYES:	Directors	T. Estremera, R. Santos, G. Kremen, L. LeZotte, J. Varela, B. Keegan
NOES:	Directors	None
ABSENT:	Directors	N. Hsueh
ABSTAIN:	Directors	None

SANTA CLARA VALLEY WATER DISTRICT

By: B. Keegan

BA[illegible]
Chair/Board of Directors

ATTEST: MICHELE L. KING, CMC

Michele L. King

Clerk/Board of Directors

RL13330.docx

Public Hearing to become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

May 24, 2016

Santa Clara Valley
Water District

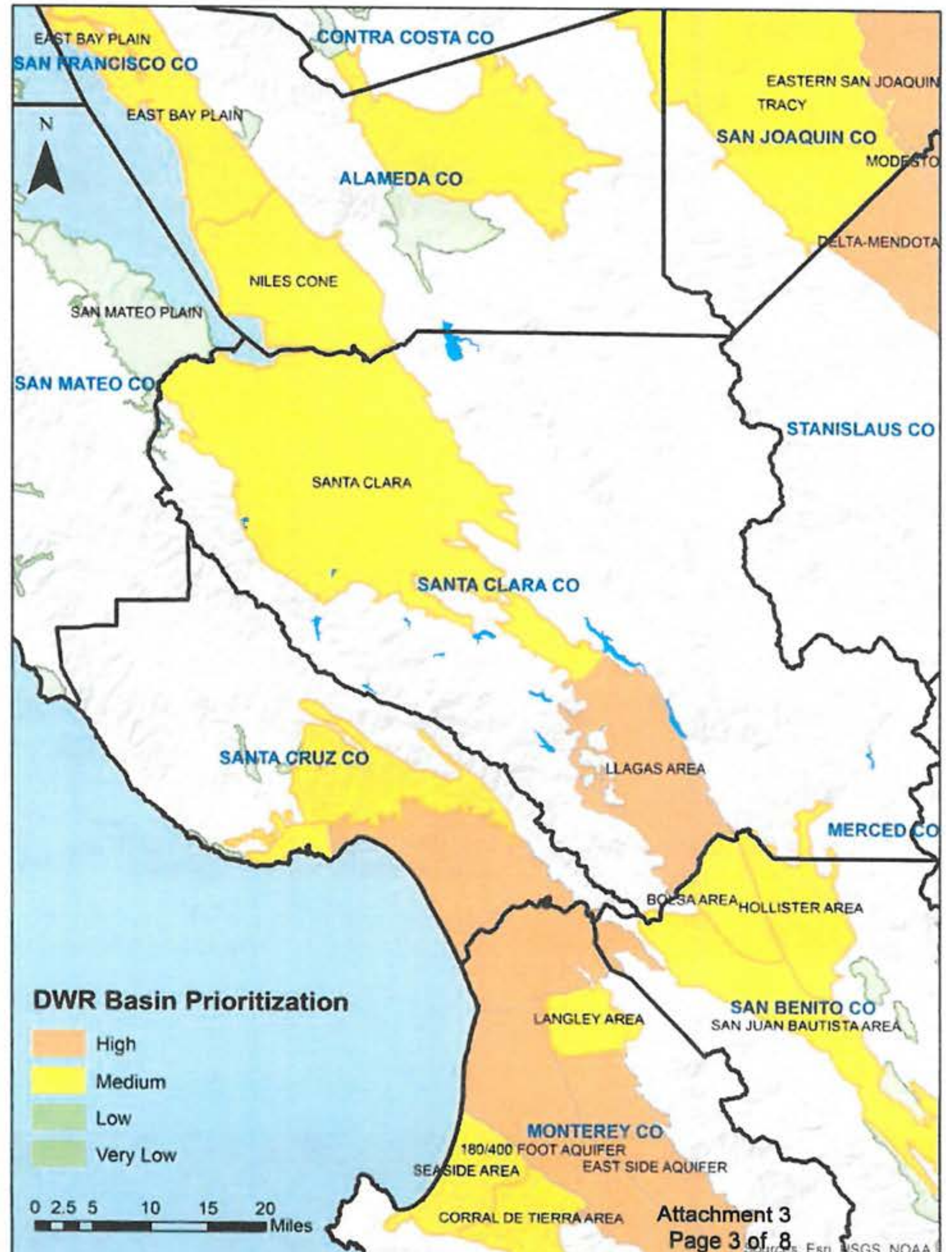
Sustainable Groundwater Management Act (SGMA)

- Framework for sustainable management in CA
  - Applies to basins designated as medium or high priority by the state
  - Provides for formation of local Groundwater Sustainability Agencies (GSAs)
  - Requires local sustainability plans
  - Provides tools to GSAs

Santa Clara Valley Water District

Santa Clara County Subbasins

- SGMA applies to the Santa Clara and Llagas Subbasins
- Strong groundwater management framework ensures continued sustainability



Historical Undesirable Results

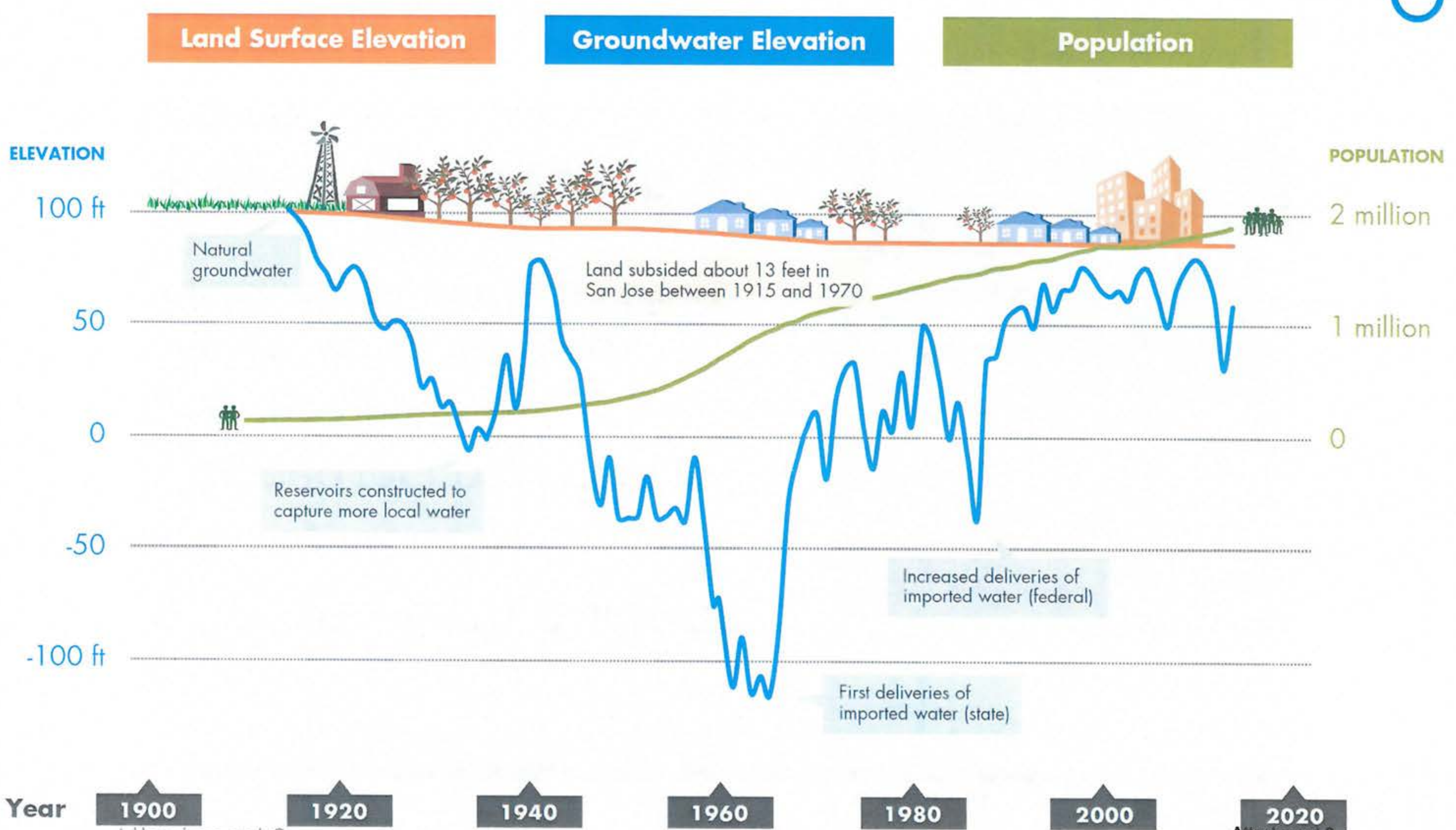
- Groundwater overdraft
  - Lower water levels
  - Reduced reliability
- Land subsidence
- Salt water intrusion

Sustainable groundwater management

SANTA CLARA COUNTY GROUNDWATER AT-A-GLANCE

a graphic representation not intended as a technical exhibit

Santa Clara Valley Water District



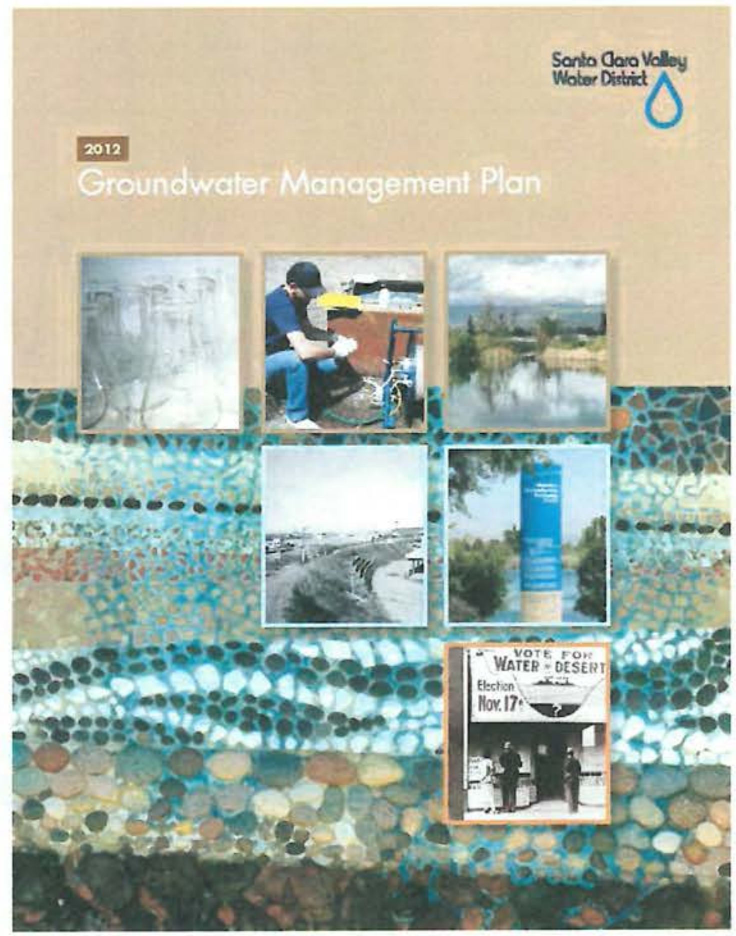
Attachment 3

Attachment 3
Page 5 of 8

Last updated November 13, 2015

Comprehensive groundwater management

- Basins in long-term balance due to
  - Managed recharge of local and imported water
  - Treated water deliveries, conservation, and recycling
- Groundwater protection programs
- Coordination with retailers and others



Santa Clara Valley Water District

Attachment 3
Page 6 of 8

Groundwater Sustainability Agencies (GSAs)

- Any local agency or combination of agencies overlying a basin can decide to be a GSA
- Agencies with statutory authority are the exclusive local agencies to comply with the Act

Agencies with Statutory Authority to Manage Groundwater (Water Code Section 10723)

Alameda County Water District
Desert Water Agency
Fox Canyon GWMA
Honey Lake Valley GWMD
Long Valley GWMD
Mendocino City CSD
Mono County Tri-Valley GWMD
Monterey Peninsula WMD
Ojai GWMA
Orange County Water District
Pajaro Valley WMA
Santa Clara Valley Water District
Sierra Valley Water District
Willow Creek GMA
Zone 7

Recommendations

- Adopt the resolution to decide to be the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins

  To confirm the District's role as local groundwater manager, ensure access to SGMA authorities and opportunities that may only be available to GSAs

- Authorize the CEO or her designee to submit the resolution and Notice of Intent to DWR

Santa Clara Valley Water District

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A2. Board Resolution to Adopt the 2016 Groundwater Management Plan and Related Agenda Item (Includes Public Comment Letters Received)

Santa Clara Valley Water District

Santa Clara Valley Water District

The Board adopted and approved recommendations B and C; and referred to the Water Conservation and Demand Management Committee to engage stakeholders in the evaluation of new authorities under the Sustainable Groundwater Management Act.

File No.: 16-0768

CONFORMED COPY

Agenda Date: 11/22/2016
Item No.: 2.7.

BOARD AGENDA MEMORANDUM

SUBJECT:
Public Hearing on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins.

RECOMMENDATION:

A. Conduct the public hearing to consider comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP);
B. Adopt the Resolution ADOPTING THE 2016 GROUNDWATER MANAGEMENT PLAN FOR THE SANTA CLARA AND LLAGAS SUBBASINS;
C. Authorize the Interim Chief Executive Officer or designee to submit the resolution and 2016 GWMP to the California Department of Water Resources; and
D. Receive information on and discuss various options with regard to future stakeholder engagement in evaluating new authorities under the Sustainable Groundwater Management Act.

SUMMARY:
To meet the planning requirements prescribed by the Sustainable Groundwater Management Act (SGMA), as well as the Emergency Groundwater Sustainability Plan (GSP) Regulations adopted by the Department of Water Resources (DWR), District staff has prepared the 2016 Groundwater Management Plan (GWMP) as an alternative to a GSP (Alternative Plan). This approach builds upon the District's previous GWMP, which was adopted by the Board in 2012. SGMA's schedule requires Alternative Plans to be submitted to DWR by January 1, 2017.

This public hearing provides an opportunity for the public to provide input to the Board on the District's draft 2016 GWMP (Alternative Plan) prior to adoption. The resolution setting the time and place of the public hearing was adopted by the Board on November 8, 2016. The draft 2016 GWMP was posted on the District website at <http://www.valleywater.org/groundwatermanagement> on or before November 4, 2016 for public review.

Staff recommends that the public hearing be conducted, and that the draft 2016 GWMP be adopted as the final 2016 GWMP by the Board as is or as modified per Board direction. Following Board adoption, the 2016 GWMP will be submitted to DWR as an Alternative Plan under SGMA by the

ADOPTED
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statutory deadline of January 1, 2017. Staff also requests Board direction on various stakeholder engagement options related to the evaluation of new authorities under SGMA following adoption of the 2016 GWMP.

Background

The District was formed in 1929 for the purposes of managing groundwater. Historically, unsustainable pumping in Santa Clara County resulted in chronic overdraft, land subsidence, and salt water intrusion. While similar problems persist in groundwater basins throughout California, Santa Clara County is recognized as an area where these issues have been, and continue to be, successfully addressed through sustainable groundwater management.

The District's purposes and authorities related to groundwater management are derived from the Santa Clara Valley Water District Act. In 2014, SGMA was signed into state law by Governor Brown, establishing new state-wide requirements and authorities for groundwater management.

For each basin subject to SGMA (including the Santa Clara and Llagas Subbasins), Groundwater Sustainability Agencies (GSAs), such as the District, must develop and implement a GSP or a prescribed Alternative. (Recall that on May 24, 2016 the Board adopted a resolution whereby the District became the GSA for the Santa Clara and Llagas Subbasins.) A GSP must be submitted to DWR by January 2022 for basins not in critical overdraft. A GSA may prepare an Alternative Plan that meets SGMA objectives; however, it must be submitted to DWR by January 1, 2017. While a GSP would not be due until 2022 for the Santa Clara and Llagas Subbasins, preparing an Alternative Plan leverages the District's comprehensive 2012 GWMP, provides maximum local control and flexibility in terms of plan content, and affirms the District as a leader in groundwater management.

2016 GWMP (Alternative Plan) Overview

The 2016 GWMP describes the District's comprehensive groundwater management framework, which has maintained sustainable conditions in the Santa Clara and Llagas Subbasins over many decades. It describes basin conditions for the Santa Clara and Llagas Subbasins and provides information on the District's history, groundwater management authority, and water supply system. The 2016 GWMP also documents the District's groundwater sustainability goals, related strategies, groundwater management programs and activities, outcome measures, and recommendations. The GWMP is consistent with the intent of SGMA and addresses state requirements for Alternatives.

The 2016 GWMP includes the following sustainability goals, based on Board Water Supply Objective 2.1.1:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water

intrusion.

The following strategies are identified to achieve the sustainability goals:

1. Manage groundwater in conjunction with surface water.
2. Implement programs to protect and promote groundwater quality.
3. Maintain and develop adequate groundwater models and monitoring networks.
4. Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.

The 2016 GWMP also includes the following outcome measures to gauge performance in meeting groundwater sustainability goals:

1. Projected end of year groundwater storage is greater than 278,000 AF in the Santa Clara Plain, 5,000 in the Coyote Valley, and 17,000 AF in the Llagas Subbasin.
2. Groundwater levels are above subsidence thresholds in the Santa Clara Plain subsidence index wells.
3. At least 95% of countywide water supply wells meet primary drinking water standards and at least 90% of Coyote Valley and Llagas Subbasin wells meet Basin Plan agricultural objectives.
4. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids (TDS).

The sustainability goals, strategies, and outcome measures are largely unchanged from the 2012 GWMP since they have been effective in maintaining sustainable groundwater conditions and prompting action when needed. Minor changes have been made for clarity and consistency. The 2016 GWMP includes potential actions that may be taken if outcome measure performance indicates improvement is needed.

The 2016 GWMP updates and supersedes all previous District groundwater management plans. Per SGMA, an Alternative Plan must be submitted to DWR by January 1, 2017 and every five years thereafter.

Outreach on the 2016 GWMP

As the primary groundwater pumpers within Santa Clara County, the District's water retailers are key stakeholders in the development and implementation of the 2016 GWMP. Coordination with water retailers has been through meetings of the Water Retailer Committee, Groundwater Subcommittee, and Water Supply Subcommittee. In addition, District staff has met with several of the retailers on an individual basis. The primary interest of the retailers is to be involved as the District considers implementation of any new authorities under SGMA.

Staff has notified water retailers, local land use agencies, and interested stakeholders of the intent to update the District's 2012 GWMP as an Alternative Plan for submittal to DWR by the January 1, 2017 statutory deadline. The District has also notified interested stakeholders about related information on the District website at <http://www.valleywater.org/groundwatermanagement> and informational

public meetings. Public meetings were held at the District's headquarters on July 21, 2016, and in Morgan Hill on August 2, 2016. Input received at those meetings was considered in preparing the draft 2016 GWMP.

Although public hearings are not required for Alternative Plans, this hearing provides an opportunity for the public to provide formal input to the Board prior to adoption of the 2016 GWMP. Notice for this public hearing was published in a newspaper of general circulation.

New SGMA Authorities and Options for Future Stakeholder Engagement

The 2016 GWMP acknowledges potential new authorities under SGMA, including the ability to: manage pumping, control well spacing or operation, and collect different types of fees. These authorities would be available upon adoption of the GWMP. However, authorities related to controlling pumping have certain constraints, and significant issues regarding the potential interference with water rights and liability associated with District regulation of pumping at individual wells must be carefully considered. District staff plans to begin evaluating these new authorities in 2017, in cooperation with water retailers and other interested stakeholders, and consider what conditions might necessitate implementation of these authorities in the future.

Potential stakeholder engagement options for evaluating the new SGMA authorities include a stakeholder committee or a formal Board advisory structure as described below. In either case, it is expected that this committee would serve on a short-term, ad-hoc basis. If the District identifies a need to implement new SGMA authorities in the future, the committee could be reinstated.

1) Stakeholder Committee Option
   To ensure broad stakeholder involvement, potential members for this staff-level committee could include representatives from the Board Advisory Committees (Agricultural Water Advisory Committee, Environmental and Water Resources Committee, and Water Commission), water retailers not represented by the Water Commission, and individual well owners.

2) Board Advisory Committee Option
   This could take the form of a new, ad-hoc committee focused on evaluating SGMA authorities, with composition similar to the stakeholder committee option above. Another option, proposed by several water retailers, is to create a subcommittee of the Water Commission to include representatives from the investor-owned utilities.

Staff is seeking Board input on potential stakeholder engagement options related to the evaluation of new SGMA authorities. Prior to formally establishing a stakeholder committee, staff proposes to come back to the Board to discuss Board principles and guidance on the evaluation of new SGMA authorities. These principles will guide development of the purpose, structure, and objectives for the stakeholder committee. Once these steps are completed, the stakeholder committee will be initiated and related evaluation will begin.

FINANCIAL IMPACT:
There is no financial impact associated with this item. Programs described in the 2016 GWMP are addressed as part of the annual District budget approved by the Board. Water utility projects

supporting the protection and augmentation of water supplies are funded through the Water Utility Enterprise fund, which includes revenue from groundwater production charges, treated water charges, and other sources.

CEQA:
This project is exempt from CEQA under CEQA Guidelines Section 15262, which exempts planning studies.

ATTACHMENTS:
Attachment 1: Resolution
Attachment 2: PowerPoint

UNCLASSIFIED MANAGER:
Garth Hall, 408-630-2750

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 16– 78

ADOPTING THE 2016 GROUNDWATER MANAGEMENT PLAN FOR THE SANTA CLARA AND LLAGAS SUBBASINS

WHEREAS, the Santa Clara Valley Water District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County; and

WHEREAS, the District's statutory boundary wholly overlies the Santa Clara Subbasin and Llagas Subbasin, identified by the California Department of Water Resources as Basins 2-9.02 and 3-3.01, respectively; and

WHEREAS, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, Water Code Section 10723(c)1(M) identifies the Santa Clara Valley Water District (District) as one of fifteen (15) agencies created by statute to manage groundwater that shall be deemed the exclusive local agencies within their respective statutory boundaries; and

WHEREAS, on May 24, 2016, the District Board of Directors adopted Resolution 16-51 on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins; and

WHEREAS, the Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore require the development of a Groundwater Sustainability Plan or prescribed alternative; and

WHEREAS, Water Code Section 10733.6(b)(1) identifies a plan developed pursuant to Part 2.75 (commencing with Section 10750) or other law authorizing groundwater management as an acceptable alternative; and

WHEREAS, the District is committed to its legislatively-created mandate to manage the surface water and groundwater resources within its jurisdiction; and

WHEREAS, the 2016 Groundwater Management Plan describes the District's comprehensive framework to ensure continued, sustainable groundwater conditions in the Santa Clara and Llagas Subbasins; and

WHEREAS, the District prepared and made available a draft of its 2016 Groundwater Management Plan, and noticed a public hearing regarding said plan, which was held on November 22, 2016; and

WHEREAS, the District Board of Directors considered the 2016 Groundwater Management Plan during a public hearing held on November 22, 2016, and has existing statutory authority to adopt the 2016 Groundwater Management Plan under the Santa Clara Valley Water District Act.

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the Santa Clara Valley Water District does hereby:

1. Adopt the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins; and

2. Authorize the Chief Executive Officer (CEO) or designee to submit the 2016 Groundwater Management Plan as an Alternative to a Groundwater Sustainability Plan to the California Department of Water Resources by January 1, 2017, as required by Section 10733.6 of the Water Code.

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District by the following vote on November 22, 2016:

AYES:	Directors	J. Varela, T. Estremera, N. Hsueh, G. Kremen, L. LeZotte, R. Santos, B. Keegan
NOES:	Directors	None
ABSENT:	Directors	None
ABSTAIN:	Directors	None

SANTA CLARA VALLEY WATER DISTRICT

By: B Keegan
BARE
Chair/Board of Directors

ATTEST: M CHELE L KING, CMC

Michele L. King
Clerk/Board of Directors

Public Hearing on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

November 22, 2016

Santa Clara Valley Water District

Attachment 2
Page 1 of 12

Recommendations

- Consider public hearing input and provide direction to staff in finalizing the 2016 GWMP
- Adopt the 2016 Groundwater Management Plan
- Authorize the CEO to submit the final GWMP to DWR
- Discuss stakeholder engagement options for evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

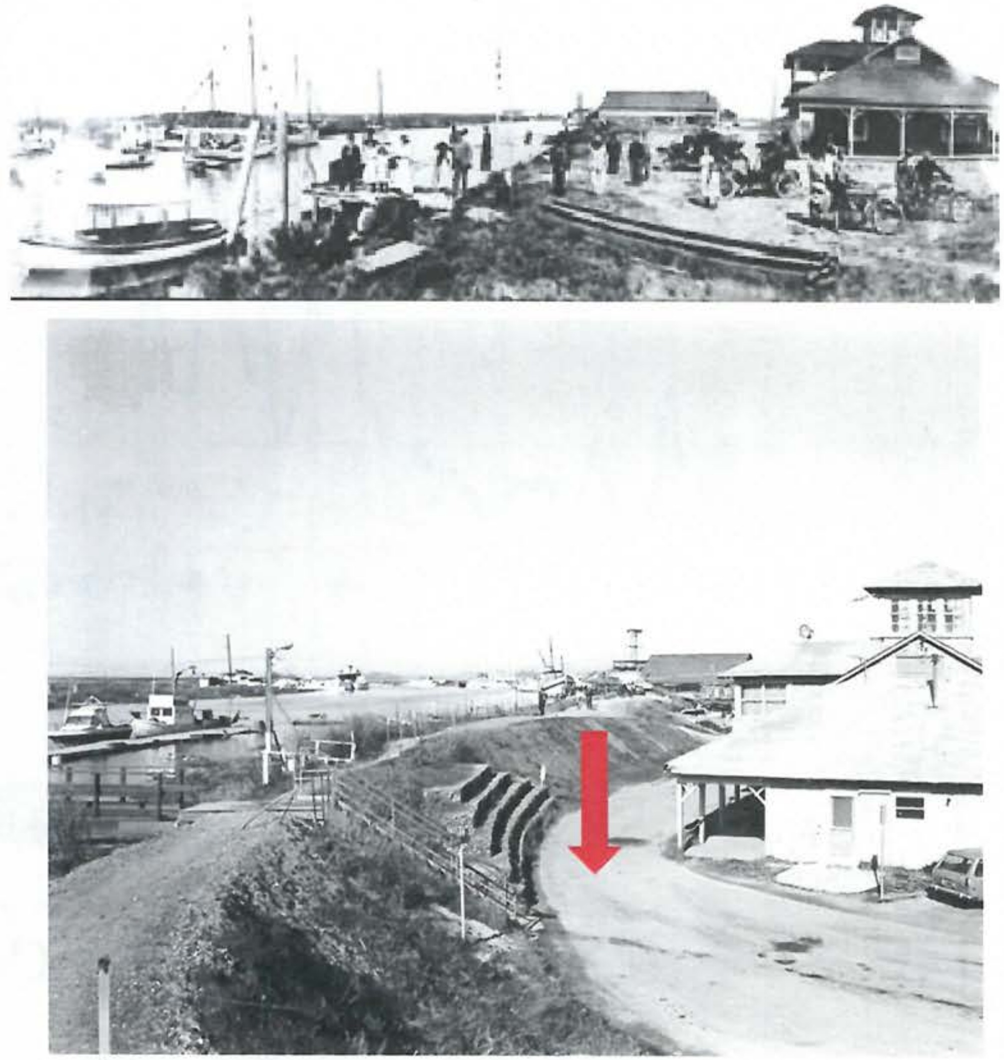
Groundwater Management Plan overview

- Long-term plan required by State law
- Updates District's 2012 plan
- Documents basin conditions, goals, and actions to ensure continued sustainability

District roots in groundwater management

Historical undesirable results:

- Long-term overdraft
  - Lower water levels
  - Reduced reliability
- Land subsidence
- Salt water intrusion



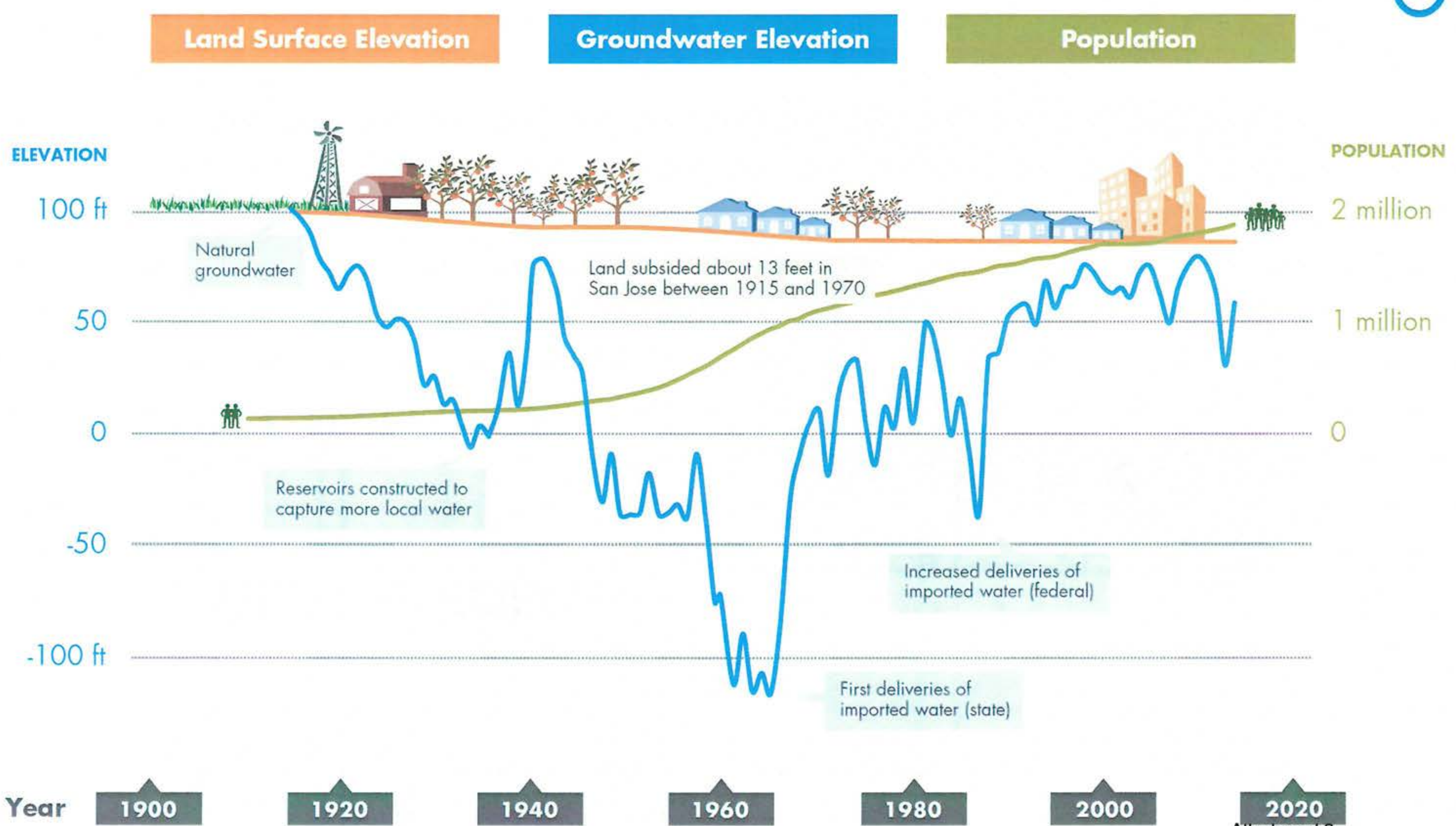
Alviso, before and after more than 6 feet of permanent subsidence

Investing in sustainability

SANTA CLARA COUNTY GROUNDWATER AT-A-GLANCE

a graphic representation not intended as a technical exhibit

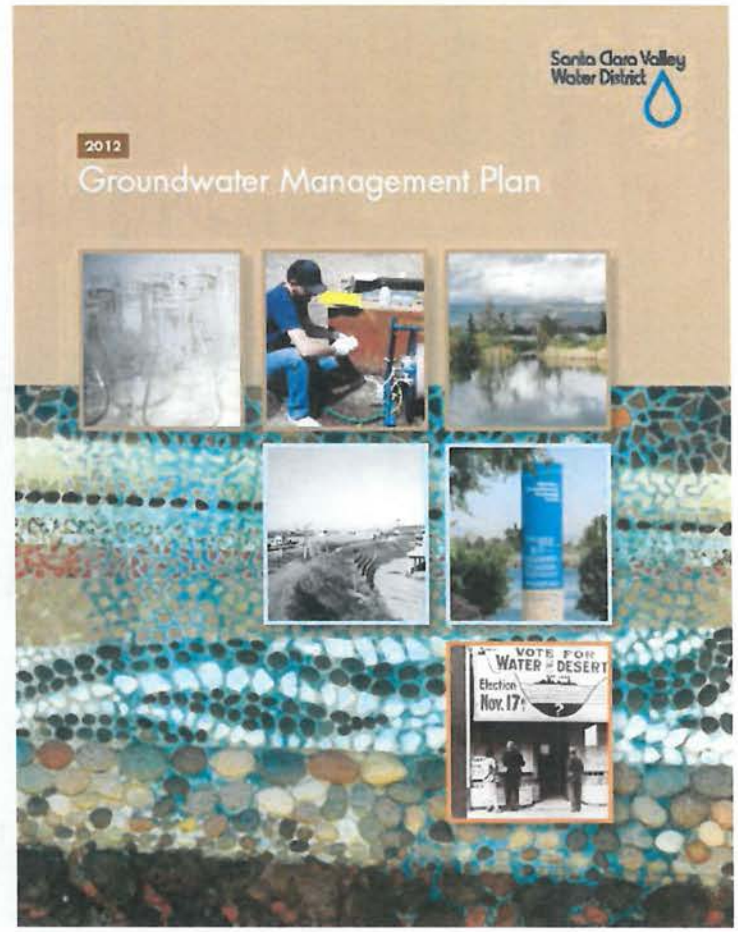
Santa Clara Valley Water District



Attachment 2
Page 5 of 12
Last updated November 13, 2015

Comprehensive groundwater management

- Basins in long-term balance due to
  - Managed recharge of local and imported water
  - In-lieu recharge (treated water deliveries, conservation, and recycling)
- Groundwater protection programs
- Coordination with other agencies and stakeholders



Santa Clara Valley Water District

2016 Groundwater Management Plan

- Goals, strategies, outcome measures prompt effective action
- Updated technical information
  - Basin setting and conditions
  - Groundwater/surface water interaction
- Information on future groundwater demands
- New SGMA authorities acknowledged

Santa Clara Valley Water District

Authorities available after GWMP adoption

- Regulation of pumping
  - Well spacing/operational requirements, pumping limitations or allocations
  - Existing water rights and potential liability must be carefully considered
- Collection of various fees
  - Fixed or tiered volumetric
  - Must comply with applicable Prop 218 provisions

Santa Clara Valley Water District

Next steps

- Finalize Groundwater Management Plan
  - Incorporate Board direction based on public hearing
  - Include resolution adopting plan
- Submit plan to DWR by January 1, 2017
- Begin evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

Next steps: evaluation of SGMA authorities

1) Board input on options for stakeholder engagement (11/22/16)
2) Board input on principles related to new SGMA authorities (early 2017)
3) Establish stakeholder committee (mid 2017)

Santa Clara Valley Water District

Stakeholder engagement options

- Option 1. Stakeholder committee
  - Potential representatives from Board advisory committees, water retailers, and individual well owners
- Option 2. Board advisory committee
  - New SGMA ad-hoc committee, or
  - New subcommittee of the Water Commission

Santa Clara Valley Water District

Attachment 2
Page 11 of 12

Recommendations (recap)

- Consider public hearing input and provide direction to staff in finalizing the 2016 GWMP
- Adopt the 2016 Groundwater Management Plan
- Authorize the CEO to submit the final GWMP to DWR
- Discuss stakeholder engagement options for evaluating new SGMA authorities in 2017

Santa Clara Valley Water District

San Jose
Water
Company

110 W. Taylor Street
San Jose, CA 95110-2131

November 18, 2016

Santa Clara Valley Water District
Attention: Barbara Keegan, Board Chair
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Submittal of an Alternative Plan Pursuant to the Sustainable Groundwater Management Act

Dear Ms. Keegan:

After more than a century without comprehensive groundwater regulation in California, the Legislature adopted the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, and established criteria for the adoption of Groundwater Sustainability Plans (GSPs). As the designated Groundwater Sustainability Agency (GSA) under SGMA, the Santa Clara Valley Water District (District) was empowered to either prepare a GSP in compliance with SGMA[1] or submit an existing Alternative Plan that meets all the requirements of SGMA as the functional equivalent required by Articles 5 and 7 of the Department of Water Resources' (DWR) SGMA Regulations.[2] The Alternative Plan must fully "demonstrate the ability of the Alternative to achieve the objectives of the Act."[3]

San Jose Water Company (SJWC) writes to express our support for sustainable groundwater management and the District moving forward with an Alternative Groundwater Sustainability Plan (Alternative Plan). However, we must also make you aware of our opposition to the District's submitting its 2012 Ground Water Management Plan (GWMP), with amendments,[4] as an Alternative Plan without your having first concurrently embraced the important role of the region's Public Water Systems (Water Systems)[5] in the shared oversight of

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[1] SGMA and related regulations (jointly referred to as "SGMA Requirements").
[2] Cal. Code Regs. (CCR) Tit. 23, Div. 2, Ch. 1.5, Sub Ch. 2, approved by the California Water Commission on May 18, 2016.
[3] 23 CCR 358.2(d).
[4] According to SGMA, however, "[b]eginning January 1, 2015, a new [GWMP] shall not be adopted and an existing [GWMP] shall not be renewed pursuant to [the Water Code]." (Wat. Code § 10750.1.)
[5] "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code (Wat. Code § 10721(s)), which defines "Public water system" as "a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." Health & Safety Code, § 116275.

certain provisions that ensure sustainability.[6] We believe this shared responsibility among the Water Systems will enable the District to adopt effective sustainability goals, while also allowing those assuming the greatest burden and interest in a successful outcome the opportunity to develop the strategy for achieving compliance.

Incorporated in 1866, SJWC is a public water system, regulated by the California Public Utilities Commission (CPUC), and has an approved Urban Water Management Plan. It has faithfully discharged its duty to provide a high quality and reliable water supply to more than 1 million people. In furtherance of this duty, it has developed a portfolio of water supplies and efficiently managed the distribution of its water for over 150 years. No water supply is more important to SJWC and the broader community it serves than its groundwater.

Toward that end, SJWC has developed appropriative and prescriptive rights to groundwater that it conjunctively uses in coordination with the District's programs as a private steward of an important public resource. In reliance on these vested proprietary water rights, SJWC has made substantial investments and developed groundwater infrastructure and well capacity sufficient to withdraw approximately 290,000 acre-feet in a single year.

Since July 2016, we have repeatedly corresponded and met with District management and staff[7] in a good faith effort to share our concerns over the adequacy of the GWMP and to suggest a shared governance model among Water Systems that may facilitate the approval of the GWMP by DWR and will improve its efficacy. Specifically, the GWMP fails to acknowledge the proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights.[8] SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater. Those interests specifically include Water Systems.[9] Consequently, the GWMP is not yet a functional equivalent of a GSP as required under applicable law. Even if it were, it holds open the question of future enforcement and will serve to undermine future planning and water supply development.

The Legislature has clearly declared that sustainable groundwater management must respect proprietary rights to groundwater.[10] In fact, it was the expressed intent of the Legislature to "preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater."[11]

SGMA requires management of groundwater within the sustainable yield of the basin.[12] GSPs and functionally equivalent Alternative Plans must have mechanisms to ensure

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[6] Wat. Code § 10735.2(a)(3)-(5)
[7] July 7, 2016 correspondence; 2016 Meetings: September 9, October 7, 12 and 20.
[8] While the Amended Plan acknowledges that pursuant to SGMA, local agencies may not determine water rights in regulating pumping, it does not define the proprietary water rights in the Basin, explain how these rights will be protected, or what the process will be to respect those rights.
[9] Water Code§ 10723.2.
[10] Wat. Code § 113(b)(4); Wat. Code § 10720(b)(4).
[11] Wat. Code § 10720.1(b).
[12] Wat. Code § 10721(v).

sustainability,[13] and the District's GWMP is lacking. If the District adopts a sustainable yield and ultimately corresponding methods to limit groundwater production within the plan area, then the burden of implementing strategies will be borne almost entirely by the sovereign Water Systems. These Water Systems have already dedicated this groundwater to a public use and have accrued proprietary groundwater rights.[14] Either a future amendment to the GWMP will address the subject of plan enforcement and its consistency with these vested rights, or a court is likely to do so. We believe the Water Systems, pursuant to a memorandum of agreement with the District, can collaboratively develop water budgets and curtailment strategies that will provide certainty and enhance efficient use.

Under the District's GWMP, Water Systems within the planning area are forced to guess as to how and when the District will move to adopt provisions to ensure sustainability that may dramatically impact their ability to plan and provide water service to their customers in the future. This uncertainty adds to the lack of regional water supply reliability, and will result in increased costs and waste, and is otherwise contrary to the public interest.

Despite requests from SJWC and other Water Systems, the District has not stated what actions it will take to ensure that sustainability objectives are achieved, or provided assurance that its actions will be consistent with vested water rights and, thus far it has been unwilling to acknowledge that measures that curtail the quantity of available groundwater are best left to the entities with the primary responsibility for distribution of groundwater. **We ask that the District agree now to a shared governance among Water Systems on the question of how any allocation of groundwater or curtailing use be borne and implemented.[15] Only this way can the District ensure that its achievement of a sustainability goal will be consistent with the vested rights cumulatively held by these entities and not resisted by them at a later date.**

Specifically, in reviewing the District's GWMP and comparing it to the standards of a GSP,[16] we wish to point out the following deficiencies:

- **Failure to Describe Basin Conditions in Required Detail.** The District's GWMP fails to describe the current status and conditions of the Santa Clara Sub-basin (Basin) with the level of detail mandated by the SGMA Requirements. The GWMP's multiple maps and other graphics depicting the Basin also fall short of providing the required information and details. These basic deficiencies suggest that the GWMP lacks sufficient baseline data to successfully, and sustainably, manage the Basin pursuant to the SGMA Requirements.

[13] 23 CCR 354.24 requires that "[t]he [GSP] shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, [and] a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield."

[14] These rights are statutorily protected against loss or diminishment by third-party conduct. Civ. Code § 1007; *see Wright v. Goleta Water District* (1985) 174 Cal.App.3d 71.

[15] A proposal for shared public water system governance by a Memorandum of Agreement is attached hereto.

[16] 23 CCR 358.2(d).

- **No Express Identification of Basin's Beneficial Users.** The District's GWMP fails to specifically identify individual beneficial users of the Basin's groundwater resources, which is required under the SGMA Requirements. Failure to identify specific Basin users also indicates that the District's GWMP lacks important, and required, data about the status of the Basin's groundwater supplies. It also may result in incomplete and an unfair distribution of enforcement burdens and one that fails to honor and protect vested rights.

- **Failure to Include Basin's Projected Water Budget.** To be functionally equivalent, a GWMP must include a basin's water budget under historical, current and future conditions. Although the District's GWMP includes a graphic illustrating the Basin's historical average annual water budget, this graphic does not include the information nor level of detail required under the SGMA Requirements. The GWMP does not include any discussion regarding the quantification of the Basin's current or future groundwater budget nor provide whether there are limitations on expanded or even existing production.

- **GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds.** Although the District's GWMP briefly identifies multiple undesirable results present in the Basin, discussion of these conditions is insufficient to meet the SGMA Requirements. In addition to this deficiency, the District's GWMP also fails to quantify current groundwater conditions and establish adequate minimum thresholds to determine when conditions in the Basin necessitate action. The four "Outcome Measures" in the Amended Plan do not meet the extensive requirements for minimum thresholds and measurable objectives for each applicable sustainability indicator. Failure to satisfy this cornerstone requirement of SGMA means that the District's GWMP is not functionally equivalent.

- **No Identification of GWMP's Data Gaps.** To be deemed functionally equivalent, a GWMP is required to identify both uncertainty and existing gaps in the data that informs the hydrogeological model within the SGMA Requirements. The District's GWMP fails to expressly identify any data gaps within either its monitoring network or the data provided about the Basin, which is a key requirement under the SGMA Requirements.

Although the District's recent draft amendment to its GWMP attempts to address these deficiencies in its 2012 GWMP, it does not fully satisfy SGMA's requirements. Moreover, SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or

amending an existing GWMP as of January 1, 2015.[17] A fair reading of the plain meaning of Water Code § 10750.1(a) suggests that an amended GWMP is not eligible for consideration as an Alternative Plan.

As stated above and in all of our prior communications, SJWC supports sustainable groundwater management. We agree the District is best situated to develop sustainability goals. However, allocating groundwater among interests and requiring curtailment to achieve sustainability goals is a matter that is best left to the vested right holders in the planning area.

Based upon our review of the District's GWMP—and as described above—we do not believe the GWMP qualifies as an Alternative Plan. It does not provide sufficient clarity as to how the GWMP will result in sustainable management or how water budget/allocations will be addressed and any curtailment enforced.

Should the District move forward with submitting its GWMP as an Alternative Plan without first acknowledging the need for shared governance on the key areas of water budget/allocations and curtailment, we are prepared to submit a comprehensive comment letter to DWR detailing the GWMP's lack of functional equivalency as summarized above and stating our opposition to its adoption at this time.

SJWC urges the District Board of Directors to defer adoption of an amended GWMP until its deficiencies are corrected and the shared governance issues identified in this letter are appropriately addressed and incorporated into the plan. SJWC looks forward to the cooperation of the District to resolve these concerns and stands ready to help develop workable solutions that balance the needs and rights of Water Systems with achieving the important basin sustainability goals required by SGMA.

Respectfully,

Andrew R. Gere, P.E.
President and Chief Operating Officer

Cc: Gary Kremen, District Board Member
John Varela, District Board Member
Linda LeZotte, District Board Member
Nai Hsueh, District Board Member
Richard Santos, District Board Member
Tony Estremera, District Board Member
Norma Camacho, District CEO
Jim Fiedler, District COO

[17] Wat. Code § 10750.1(a).

MEMORANDUM OF AGREEMENT ("MOA") BETWEEN PUBLIC WATER RETAILERS AND THE SANTA CLARA VALLEY WATER DISTRICT ("DISTRICT") REGARDING THE IMPLEMENTATION OF THE 2012 GROUNDWATER MANAGEMENT PLAN, ALTERNATIVE PLAN OR SUSTAINABLE GROUNDWATER MANAGEMENT PLAN

WHEREAS, Public Water Retailers are "public water systems" that produce groundwater within Santa Clara County and are required to prepare and file Urban Water Management Plans ("UWMP") with the California Department of Water Resources;

WHEREAS, the District is a multi-purpose water management district with the powers set forth in its authorizing act and is the agency designated as the Groundwater Sustainability Agency ("GSA") for purposes of preparing a Groundwater Sustainability Plan ("GSP") and implementing the California Sustainable Groundwater Management Act ("SGMA") within Santa Clara County for the Santa Clara and Llagas subbasins ("subbasins");

WHEREAS, since the 1930's, the District's water supply strategy has been to maximize conjunctive use, the coordinated management of surface and groundwater; [1]

WHEREAS, Tables ES-1 and ES-2 of the District 2012 Groundwater Management Plan ("2012 GMP") acknowledge the shared responsibility and cooperation with others that is required to effectively manage groundwater within these areas;[3]

WHEREAS, Section 2.2 of the 2012 GMP states that "[n]early half of the water used in Santa Clara County is pumped from groundwater, one of the county's greatest natural resources," and that UWMP of the public water systems demonstrate that these water retailers show a continued reliance upon groundwater to meet the needs of their customers;[4]

WHEREAS, Section 1.3 of the 2012 GMP reflects the District's intention to be a regional partner in groundwater management;

WHEREAS, Section 4.1.4 of the 2012 GMP acknowledges that the subbasins in Santa Clara County are not adjudicated and the District does not legally control the operation of groundwater wells or the amount of groundwater that wells can produce;

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[1] 2012 Groundwater Management Plan, ES-1.
[3] 2012 Groundwater Management Plan, Tables ES-1 and ES-2.
[4] 2012 Groundwater Management Plan, Section 4.1.5 and 1.3.

WHEREAS, a key component of the water supply reliability performance under the 2012 GMP and approved UWMP depends on the cooperation between the District and its water retailers, which is "critical during times of shortage;"[5]

WHEREAS, the District resolved to continue and enhance further groundwater management partnerships;[6]

WHEREAS, the District has announced its intention to submit its 2012 GMP as an Alternative Plan in lieu of a GSP in compliance with SGMA, and to qualify Alternative Plans must fulfill the objectives of a GSP;

WHEREAS, groundwater management pursuant to SGMA must be consistent with Section 2 of Article X of the California Constitution and nothing within SGMA may modify the priorities of common law water rights[7] and the statutory protection of those rights;[8]

WHEREAS, SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater within the plan area and those "interests" specifically include public water systems[9]; and

WHEREAS, SGMA provides that a GSA may implement a plan pursuant to legal agreement in a manner consistent with Recommendation 7-5 of the District 2012 GMP, pursuant to an MOA.

NOW THEREFORE, the Parties hereby agree that a Water Rights Committee with the foregoing powers and authority shall be formed to guide implementation of the 2012 GMP as an Alternative Plan or a GSP as either the 2012 GMP or GSP may be amended and approved by DWR from time to time.

1. Water Rights Committee.

A "Water Rights Committee" ("WRC") is hereby established by written agreement among the signatory Water Retailers and the District. This WRC will wield the responsibility for coordinating and facilitating implementation of the 2012 GMP or a GSP (collectively hereinafter the "SGMA Plan") with regard to the following subjects in the manner described:

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[5] 2012 Groundwater Management Plan, Section 4-1-4 at p. 4-5.
[6] 2012 Groundwater Management Plan, Recommendation: 7-3(5) at pp. 7.4-7.5 .
[7] Water Code § 10720.5.
[8] See. e.g. Civil Code § 1007, Water Code §§ 106, 106.5; Public Utilities Code § 851.
[9] Water Code § 10723.2; Section 354.10 of the GSP Regulations ("Notice and Communication").

(a) Curtailment/Apportionment. In the event that either the District determines that curtailment of groundwater production or an apportionment of groundwater (allocation) within the subbasins is required to avoid causing undesirable results under a SGMA Plan, then:

(i) The District will notify the WRC in writing of the need for a curtailment/apportionment plan to avoid causing undesirable results;

(ii) At any time on its own initiative, the WRC may, or within twelve (12) months of its receipt of written notice from the District, the WRC will prepare a curtailment/apportionment plan;

(iii) The methodology to curtail existing extractions or apportionment of groundwater shall be developed by the WRC in its complete discretion;

(iv) Any WRC curtailment/apportionment plan shall be presented to the District for its consideration and inclusion in any SGMA Plan;

(v) The District will accept and include the WRC curtailment/apportionment plan developed by the WRC in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC allocation/curtailment plan, including proposed mitigation measures, do not provide reasonable assurance that "undesirable results" will be avoided;

(vi) In the event the District disagrees with the WRC curtailment/apportionment plan pursuant to (v) above, the District may seek to set aside the adoption of the WRC plan pursuant to Code of Civil Procedure (CCP) § 1085;

(vii) The Parties will exercise good faith and reasonable efforts to coordinate the implementation of any interim measures required to protect against "undesirable results" during the WRC's development of a curtailment/apportionment plan;

(viii) If after twelve (12) months from the date of the District's notice required in paragraph (a)(i) above, the WRC fails to complete a curtailment/apportionment plan and present the plan to the District for approval, then the District may prepare its own curtailment/apportionment plan. If the WRC disagrees with the District's plan, then the WRC may seek to set aside the adoption of the District's curtailment/apportionment plan pursuant to CCP § 1085.

(b) Transfer and Carry-Over. If water allocations are created pursuant to section 1(a) of this MOA, the WRC may, in its complete discretion, develop a transfer and carry-over plan further implementing a SGMA Plan that will establish rules and conditions for the transfer, conservation, and carry-over of any unused allocation between and among the public water systems.

(i) The WRC will notify the District in writing of its intent to prepare a transfer and carry-over plan, and thereafter the WRC will exercise good faith and reasonable diligence in preparing a transfer and carry-over plan;

(ii) The methodology for transfer and carry-over of any allocations shall be developed by the WRC in its complete discretion, subject to the express requirement that the transfer and carry-over plan will not cause or threaten to cause unmitigated "undesirable results;"

(iii) The District will accept and include a WRC transfer and carry-over plan in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC transfer and carry-over plan, including proposed mitigation measures, do not provide reasonable assurances against causing or threatening to cause "undesirable results;"

(iv) In the event the District disagrees with the WRC transfer and carry-over plan pursuant to (b)(iii) above, the District may seek to set aside the adoption of the WRC plan pursuant to CCP § 1085.

(c) Storage and recovery of imported water. The District will submit any plan that will limit or condition the ability of public water systems to import foreign (out of County, out of watershed) supplemental water into the subbasins for storage and recovery by the public water systems to the WRC for its review and consideration.

(i) The District will provide written notice to the WRC of its intent to prepare a storage and recovery plan;

(ii) The storage and recovery plan shall not impair the operating ability of a public water system or cause or threaten to cause "undesirable results;"

(iii) The District will seek the WRC's approval of any storage and recovery plan prior to inclusion in any SGMA Plan;

(iv) If the WRC disagrees with the District's plan, then the WRC may seek to set aside the District's adoption of its storage and recovery plan pursuant to CCP § 1085;

(v) Alternatively, if the District has not issued a notice of its intention to prepare a storage plan pursuant to (c)(i) above, the WRC may independently develop a plan for the storage and recovery of imported water to enhance local water supply reliability. The WRC will present any WRC plan for the storage and recovery of water to the District for inclusion in a SGMA Plan. The District will accept and include the WRC storage and recovery plan unless, after a good faith

evaluation, it finds that storage and recovery of imported water will cause or threatens to cause "undesirable results" or will directly interfere with existing District operations or replenishment programs;

(vi) The WRC may challenge the District's decision not to include the storage and recovery plan in a SGMA Plan pursuant to CCP § 1085.

(d) Well Permits / Well Location. The District will not restrict or seek to regulate a public water system's ability to produce groundwater for public consumption by an existing, replacement or new well unless there is a direct and immediate threat to the health, safety and welfare that is separate, discrete and distinguishable from groundwater production in the subbasin as a whole. If the District determines in its discretion that such an immediate and direct threat to the health, safety, and welfare of the community exists, it may act by an urgency ordinance to reasonably condition the new wells but only for so long as the actual emergency condition exists. The District will exercise good faith and reasonable efforts to coordinate with the WRC to develop a consensus on reasonable conditions to protect public health and safety and to avoid undesirable results. The WRC may challenge the District's plan to limit or condition well permits and well location pursuant to CCP §1085.

2. Water Rights Committee Representation.

The WRC shall be comprised of representatives appointed by each of the Public Water Retailers and drawn from its membership.

Voting: Except as specifically otherwise provided herein, the vote of a majority of the members of the WRC present at any regular, adjourned or special meeting shall be sufficient to pass or act upon any matter properly before the WRC, and each member of the WRC shall have one vote.

Groundwater Weighted Voting: Upon the call and request of any WRC member, present and able to vote, and a quorum being present, a weighted voting formula shall apply for any vote to be taken by the WRC, with each member having one or more votes based upon the groundwater pumping set forth in Exhibit A. In order for the WRC to take action under the provisions of this section two requirements must be fulfilled:

a) A majority of the votes weighted by groundwater pumping must be cast in favor of the action, provided that not less than two member agencies vote in favor of the action; and

b) A majority of the members vote in favor of the action. In the event a simple majority vote on a question has previously been taken, and a weighted vote is subsequently called; a roll call vote will be taken that tabulates both the weighted vote and the members voting. The vote weighted by a majority of

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those voting representing a majority of the groundwater pumping shall supersede the previous simple majority vote, provided that the vote of a single member may not defeat an action.

Groundwater Pumping: For the purposes of determining the weighted vote of water retailers or the At-Large representative, the weighted vote by groundwater use shall be based on the historical groundwater pumping range set forth in Exhibit A, which may be updated annually by the WRC to reflect the actual increase in a WRC member's groundwater use.

3. WRC Formation and Organization.

The Public Water Retailers agree to form the WRC by January 15, 2017.

(a) Quorum. A majority of the voting power of the WRC shall constitute a quorum for the transaction of affairs and the approval or disapproval of plans and actions set forth in paragraph 1(a)-1(d) above. Any action or recommendation of the WRC shall be transmitted to the District in writing.

(b) Organizational Meeting. At its first meeting each year, the WRC shall elect a chairperson and vice-chairperson from its membership. It shall also elect a secretary and treasurer as may be appropriate, and the positions need not be from its membership.

(c) The WRC shall conduct its business in accordance with Robert's Rules of Order and the California Open Meetings Law, and shall establish further governing rules and procedures as may be necessary and convenient for the WRC.

4. Binding on All Plans.

The commitments set forth in this MOA shall apply to any SGMA Plan.

5. Effective Date.

The MOA is effective upon execution of the Parties.

EXHIBIT A

Method: All Retailers Represented with Weighting except that use <400 AFY[1].
One At-Large representative to be appointed from among parties that use <400 AFY.

Retailer	# of Votes	Range in AF		# of Votes
San Jose Water Company	10	55,800	62,000	10
Santa Clara	3	49,600	55,800	9
Great Oaks[2]	3	43,400	49,600	8
Gilroy	2	37,200	43,400	7
Morgan Hill	2	31,000	37,200	6
Cal Water	1	24,800	31,000	5
Sunnyvale	1	18,600	24,000	4
San Jose	1	12,400	18,600	3
Mountain View	1	6,200	12,400	2
At-Large	1	0	6,200	1
Total	25			

Range = Total GW/#votes
Total GW = 155,000
votes = 25

GROUNDWATER USE IN AF

	2010 UWMP	% Total
San Jose Water Company	60,500	39.0%
Santa Clara	14,800	9.5%
Great Oaks	12,300	7.9%
Gilroy	8,500	5.5%
Morgan Hill	7,800	5.0%
Cal Water	5,200	3.4%
Sunnyvale	1,200	0.8%
San Jose	400	0.3%
Mountain View	400	0.3%
Stanford	200	0.1%
Independent Santa Clara	9,800	6.3%
Independent Coyote Valley	5,000	3.2%
Independent Llagas	28,900	18.6%
Total	155,000	100.0%

[1] SCVWD 2010 UWMP
[2] Great Oaks rounded up to 12,400

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Michele King

From:	D. Muirhead [doug.muirhead@stanfordalumni.org]
Sent:	Tuesday, November 22, 2016 11:47 AM
To:	Clerk of the Board
Cc:	Vanessa De La Piedra
Subject:	Comments on 2016 Groundwater Management Plan SCVWD Board meeting November 22 2016 # 2.7. Public Hearing

Comments on 2016 Groundwater Management Plan of November 2016
for the Santa Clara and Llagas Subbasins
Board meeting November 22 2016
2.7. Public Hearing on 2016 Groundwater Management Plan

My compliments to the Groundwater Monitoring and Analysis Unit for a much improved 2016 plan compared to the 2012 plan. It helps greatly to have the material on each subbasin gathered into its own chapter. This makes it easier to understand where we can have common management approaches across subbasins, and where more targeted concerns must be addressed: land subsidence and salt water intrusion in North County, groundwater quality and groundwater recharge in South County.

The classification of the subbasins as medium and high priority appears in the Executive Summary but is not defined until the Introduction.
The definition does not appear in the Glossary. I had incorrectly assumed that higher priority meant a problem such as overdraft.

> DWR has identified the Santa Clara Subbasin as a medium-priority subbasin and the Llagas Subbasin as a high-priority subbasin based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts. Neither subbasin has been identified as being in overdraft. [pg 1-1]

Since the authorities available under SGMA would be available upon Board adoption of the 2016 GWMP [pg ES-5] (or when DWR accepts it?), it is unclear to me what the timeline will be or what sort of checkpoints will exist in defining what to do with new abilities such as regulating groundwater pumping and assessing different types of groundwater charges. In Regulation of Groundwater Pumping [pg 1-12], you may be able to "impose spacing requirements on new well construction to minimize interference". This is challenged by "Property owners and municipalities have rights to the reasonable, beneficial use of groundwater". Sustainable Management Criteria Strategy 4 says that you will "work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination" [pg 5-5].
Since my number one priority is finding ways to increase groundwater recharge in South County, I am very interested in how you determine how and when to use your new abilities.

It would help me if you would explain what "managing your water rights" ("The District currently has 20 appropriative water rights licenses and 1 filed water right permit with the SWRCB" [pg 4-1]) means. I understand that water rights are complicated and contentious, but what does it mean in terms of day-to-day operations of the District?

In Basin Management, you mention an Injection Well Pilot. "The injection well is not currently in operation" [pg 6-3]. Was it ever used? Under what conditions would it be used in the future?

In Basin Management, under Water Banking, you say that we "withdraw" our water from the Semitropic Groundwater Bank by being "delivered imported water from the Delta that would have otherwise been delivered to the banking partner or to other SWP contractors" [pg 6-4]. You should mention that the assumption that we could get deliveries from the Delta failed us in recent years, and the District thus considered the Reverse Flow project.

I want to encourage more measurements and fewer estimates. In Basin Management, under Groundwater Production Measurement, you say

"meters are only installed at those sites determined to be economically feasible or as required to facilitate the complete and accurate collection of groundwater production revenue". "Metered wells extract the vast majority of the groundwater used. Where meters are not used, crop factors are used to determine agricultural water use and average values are used to estimate domestic use". [pg 6-6]

Under Groundwater Monitoring and Modeling Data Management, are we limited in our collection and analysis by

"Because the District's access agreements with some private well owners do not provide for public release, some information has to be summarized or obscured prior to release" [pg 7-22].

Having read the Watershed Emergency Report Team report on the Loma Fire, heard after-action reports by CalFire at HLUET and SCC OAC, and toured the area with OSA, I think post-fire issues should be addressed in Watershed Management [pg 6-20]. For example, should obstructions be removed from creeks (decrease flood risk) or remain to slow debris flows which degrade water quality downstream to local users and our reservoirs?

I will withhold judgment on whether projected future shortfalls are only of concern during multi-year droughts.

I know you all try very hard to engage with the public. And I know you mean it when you say that the public are important partners [pg 6-17]. But neither Groundwater Awareness Week nor the public input meetings for the Groundwater Management Plan received any notice in Morgan Hill. Unfortunately, I do not have any suggestions.

Thank you for your consideration,
Doug Muirhead, Morgan Hill

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GREAT OAKS WATER COMPANY

P. O. Box 23490
San Jose, California 95153
(408) 227-9540

November 22, 2016

Hand-Delivered

Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San José, CA 95118

RE: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

Sustainable Groundwater Management Act Submission of Alternative Plan

Dear Chair Keegan, Vice Chair Varela, and Board Members

On November 8, 2016, the Board of Directors (Board) of the Santa Clara Valley Water District (District) adopted a Resolution authorizing publication of a notice calling for a public hearing to consider comments on the 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins Prior to its Adoption. The November 8, 2016 Resolution provides, in pertinent part:

> WHEREAS, the District "intends to adopt the 2016 Groundwater Management Plan as an Alternative Plan to be submitted to the California Department of Water Resources for compliance with the Sustainable Groundwater Management Act;

Great Oaks Water Company (Great Oaks) will be directly affected by the proposed Alternative Plan and submits this letter to the Board in response to the Board's solicitation of comments on the proposed Alternative Plan. Great Oaks respectfully requests that this letter, in its entirety, be entered into the record at the November 22, 2016 public hearing.

I apologize for not being able to present these matters in person at the November 22, 2016 hearing, but my travel plans for the Thanksgiving holiday were made prior to the District's very recent scheduling of the hearing on this matter, and I will be in transit to be with family at the time of the hearing. For future reference, please be mindful that when scheduling hearings

on important matters such as this, full public participation is best served when the hearings are not held just before major holidays when families often travel to be together

Submission of Alternative Plan

The Alternative Plan is ostensibly being submitted under California Water Code (Water Code) Section 10733.6(b)(1).[1] As such, it is essential that the Alternative Plan satisfies the objectives of SGMA[2] and each of its elements is functionally equivalent to a Groundwater Sustainability Plan (GSP) submitted required by Sections 5 and 7 of Title 23, Division 2, Chapter 1.5, Subchapter 2 of the California Code of Regulations.[3]

Background

One of the critical legislative declarations providing rationale for the Sustainable Groundwater Management Act (SGMA) is that, "[w]hen properly managed, groundwater resources will help protect communities, farms, and the environment against prolonged dry periods and climate change, preserving water supplies for existing and potential beneficial use."[4] Likewise, an essential element of the legislative intent behind SGMA requires the Legislature, as well as local and regional agencies acting under the authority of SGMA, "[t]o respect overlying and other proprietary rights to groundwater."[5]

All of Great Oaks' water supplies are sourced from the Santa Clara Subbasin. Aware of the significance of SGMA, at Great Oaks' request, a meeting was held at the District on November 4, 2014 to generally discuss the ramifications of SGMA and, specifically, the portion of SGMA that provides that nothing in the new law determines or alters groundwater rights.[6]

District staff attended the meeting together with several "water retailers" and the discussion was both constructive and robust. The parties agreed that any action taken or otherwise contemplated by the District that would have the potential to affect groundwater rights would be the subject of further discussion and, ideally, agreement. None of the attendees expressed the desire to engage in a lengthy and expensive legal action to adjudicate respective groundwater rights, but all recognized that a basin adjudication could be triggered by District action taken without proper regard for historic groundwater production and rights.

In June of 2016, District staff advised the retailers of the District's intention to update its 2012 Groundwater Management Plan (GMP) and submit the updated GMP[7] as an Alternative Plan under SGMA. This raised immediate concerns among the retailers for several reasons.

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[1] Alternative Plan, page ES-1.
[2] Water Code §10733.6(a).
[3] Groundwater Sustainability Plan Regulations, hereinafter referred to as GSP Regulations.
[4] Uncodified findings, Sustainable Groundwater Management Act, SB 1168 (Pavley), AB 1739 (Dickinson), and SB 1319 (Pavley).
[5] *Id.*
[6] Water Code §10720.5(b).
[7] The District refers to the updated 2012 GMP as the 2016 Groundwater Management Plan.

First, the submission deadline for an Alternative Plan is January 1, 2017.[8] At the time of the announcement of the intention to submit an updated GMP as its SGMA Alternative Plan, District staff had barely begun the process and had mere months to review and update the 2012 GMP. Nothing has changed this time consideration, which has now manifested itself in a process by which the District has released its proposed Alternative Plan and scheduled a hearing on it to receive comments, all in the span of less than three weeks. As noted above, the scheduling of the public hearing on this matter just prior to the Thanksgiving holiday, after many, including the undersigned, had already made travel plans, will not result in the type of open and collaborative public process an important matter like this requires and deserves.

Next, the District and the water retailers are well aware that the 2012 GMP does not contain any formalized decision-making process to resolve or even address issues pertaining to groundwater rights in the event of District action that actually or potentially affects groundwater rights. At present, without any formally-established methodology, any such issues may or may not be addressed with retailers.

The same is true with respect to water retailer operations affected or potentially affected by District actions pertaining to the groundwater Subbasins. The District has a significant and very meaningful deficit in experience in operating a retail water business (*i.e.*, a classic water utility), as compared to the water retailers. District groundwater actions should not be taken without a full understanding of the effects of those actions on the retailers and their customers – the residents and businesses of Santa Clara County. The 2012 GMP and its update do not provide for or establish a procedure to address these issues.

And, just as importantly, the largest water-producing retailers have no established authority to provide meaningful input, response, or advice on such District actions, except through retailer committees or subcommittees that have no Board advisory role. San Jose Water Company (SJWC), California Water Service Company (Cal Water), and Great Oaks are three of the largest water producers in the County, with SJWC being the largest by far. Yet, SJWC, Cal Water, and Great Oaks have no status on any Board advisory committee. At best, these three water retailers, serving a population larger than all other Santa Clara County water retailers combined, are relegated to voicing their concerns through District staff or through non-advisory committees and subcommittees, and hoping those concerns are heard by the Board.

Recent Actions

This last point is one of the reasons that on July 20, 2016, SJWC sent a letter to District's Interim Chief Executive Officer Norma Camacho requesting a role for SJWC as "a constructive partner in the decision-making pertaining to [the District]'s implementation and compliance with SGMA, and the control of groundwater extractions." SJWC invited Cal Water, Great Oaks, and the City of Santa Clara to participate in a meeting on the subject with Ms. Camacho and members of the District staff on September 14, 2016.

[8] Water Code §10733.6(c).

During the course of that meeting, every effort by the retailers to forge a formalized procedure for decision-making under SGMA was met with resistance. District representatives at the meeting pointed to past voluntary cooperation and coordination among the District and the retailers as examples of how decisions *might* be made under SGMA. Decisions *might* also be made in an entirely different, without even soliciting cooperation or engaging in coordination. Simply put, the District's process for making SGMA-related decisions is neither defined nor established.

In Ms. Camacho's October 7, 2016 letter to SJWC following the meeting, the same examples were provided and, again, no written assurances of an established decision-making procedure were offered or provided. In short, the efforts of the retailers to establish a formalized process for SGMA decision making were rejected in favor of hoped for voluntary collaboration on groundwater management issues.

In the end, the proposed Alternative Plan fails to include any formalized procedure to address the legitimate SGMA-related concerns of water retailers, especially the non-public agency retailers. The staff presentation accompanying the proposed Alternative Plan only speaks to "stakeholder engagement options" that include potential representation on a new ad hoc Board advisory committee or through a new subcommittee of the Water Commission (which would still not include SJWC, Cal Water, and Great Oaks).

The Alternative Plan Does Not Satisfy SGMA Objectives

In a letter dated November 18, 2016, SJWC provided a comprehensive analysis of the proposed Alternative Plan (SJWC Letter).[9] The SJWC details the many deficiencies of the proposed Alternative Plan, and Great Oaks joins with SJWC in opposition to the proposed Alternative Plan for the reasons stated in the SJWC Letter.

In addition to the deficiencies noted by SJWC, the proposed Alternative Plan also fails to include the required "Notice and Communication" section, with the necessary elements of (1) an explanation of the District's decision-making process; and (2) identification of opportunities for public engagement and a discussion of how public input and response will be used.[10]

There is, of course, no "Notice and Communication" section in the Alternative Plan at all. Section 1.5 of the Alternative Plan is entitled "Groundwater Management Partners and Stakeholders," but this section does not include an explanation of how the District will make decisions pertaining to groundwater management that affect water retailers, especially the largest water-producing retailers.

At best, the Alternative Plan references "the shared goal of protecting groundwater resources" and notes: "Ongoing strong partnership and collaboration will be essential to meet

[9] The SJWC letter is attached hereto and incorporated herein by reference.
[10] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2. Groundwater Sustainability Plans, §§354.10(d)(1) and (2).

future water supply challenges."[11] This hoped-for collaboration between the District and water retailers appears to be the District's "decision-making process." But this is contradicted by the description of the role of water retailers in groundwater management, which makes no reference to *any* decision-making responsibility on the part of water retailers.[12] There is no explanation of how input and response from water retailers will be used, if at all, when decisions are made that affect or potentially affect groundwater rights and water retailer operations.

Despite the claim that the information and elements of the Alternative Plan are "functionally equivalent to the elements of a [Groundwater Sustainability Plan] required by Articles 5 and 7 of the [GSP Regulations]"[13], that is clearly not the case. The Alternative Plan is deficient under both SGMA and the GSP Regulations because, among other reasons, it does not satisfy the objectives of SGMA and it does not contain the required explanation of the decision-making process, including how public input and response (including that from water retailers) will be used.

As detailed above, Great Oaks has been involved in specific efforts to establish a formal procedure for making decisions that affect or potentially affect water-producing retailers. Since this is a requirement of an Alternative Plan, now is the time to include that procedure in the Alternative Plan.

<u>Other Issues</u>

SGMA generally requires all groundwater basins in the State to be managed under a Groundwater Sustainability Plan (GSP), with high and medium-high priority basins to be managed under a GSP by January 31, 2020, and all other groundwater basins to be managed under a GSP by January 31, 2022. The Santa Clara Subbasin has been determined by the State to be of medium priority, while the Llagas Subbasin has been determined to be of high priority.[14] Neither the Santa Clara Subbasin nor the Llagas Subbasin is of low or very-low priority.

The proposed Alternative Plan is framed as a Groundwater Management Plan, not as a GSP under SGMA. The conclusory statements in the proposed Alternative Plan to the effect that it meets GSP objectives are unsupported, as detailed in the SJWC Letter and above. Because the Department of Water Resources will be unable to issue a determination that the Alternative Plan satisfies SGMA objectives for GSPs, the Alternative Plan will violate Water Code §10750.1(a).

Since, through its own decisions, the District has left itself very little time to cure the deficiencies in its proposed Alternative Plan, an alternative course of action would be to take the time necessary to properly prepare a GSP for submittal to the Department of Water Resources so that it will be in effect by January 31, 2020.

[11] Alternative Plan, pages 1-14 and 1-15.
[12] *Id.*, at page 1-16. Only within the District's groundwater management role is there a reference to coordination with water retailers and others.
[13] *Id.*, at page ES-1.
[14] See District Board Resolution 16-51, adopted May 24, 2016.

Great Oaks reserves the right to object to the Alternative Plan and/or submit materials in opposition to the Alternative Plan to appropriate State authorities. Should there be any questions, please contact the undersigned directly.

Great Oaks Water Company

Timothy S Guster

Timothy S Guster
Vice President and General Counsel
Legal and Regulatory Affairs

Attachment: SJWC Letter

San Jose Water Company

110 W. Taylor Street
San Jose, CA 95110-2131

November 18, 2016

Santa Clara Valley Water District
Attention: Barbara Keegan, Board Chair
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Submittal of an Alternative Plan Pursuant to the Sustainable Groundwater Management Act

Dear Ms. Keegan:

After more than a century without comprehensive groundwater regulation in California, the Legislature adopted the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, and established criteria for the adoption of Groundwater Sustainability Plans (GSPs). As the designated Groundwater Sustainability Agency (GSA) under SGMA, the Santa Clara Valley Water District (District) was empowered to either prepare a GSP in compliance with SGMA[1] or submit an existing Alternative Plan that meets all the requirements of SGMA as the functional equivalent required by Articles 5 and 7 of the Department of Water Resources' (DWR) SGMA Regulations.[2] The Alternative Plan must fully "demonstrate the ability of the Alternative to achieve the objectives of the Act."[3]

San Jose Water Company (SJWC) writes to express our support for sustainable groundwater management and the District moving forward with an Alternative Groundwater Sustainability Plan (Alternative Plan). However, we must also make you aware of our opposition to the District's submitting its 2012 Ground Water Management Plan (GWMP), with amendments,[4] as an Alternative Plan without your having first concurrently embraced the important role of the region's Public Water Systems (Water Systems)[5] in the shared oversight of

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[1] SGMA and related regulations (jointly referred to as "SGMA Requirements").

[2] Cal. Code Regs. (CCR) Tit. 23, Div. 2, Ch. 1.5, Sub Ch. 2, approved by the California Water Commission on May 18, 2016.

[3] 23 CCR 358.2(d).

[4] According to SGMA, however, "[b]eginning January 1, 2015, a new [GWMP] shall not be adopted and an existing [GWMP] shall not be renewed pursuant to [the Water Code]." (Wat. Code § 10750.1.)

[5] "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code (Wat. Code § 10721(s)), which defines "Public water system" as "a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." Health & Safety Code, § 116275.

certain provisions that ensure sustainability.[6] We believe this shared responsibility among the Water Systems will enable the District to adopt effective sustainability goals, while also allowing those assuming the greatest burden and interest in a successful outcome the opportunity to develop the strategy for achieving compliance.

Incorporated in 1866, SJWC is a public water system, regulated by the California Public Utilities Commission (CPUC), and has an approved Urban Water Management Plan. It has faithfully discharged its duty to provide a high quality and reliable water supply to more than 1 million people. In furtherance of this duty, it has developed a portfolio of water supplies and efficiently managed the distribution of its water for over 150 years. No water supply is more important to SJWC and the broader community it serves than its groundwater.

Toward that end, SJWC has developed appropriative and prescriptive rights to groundwater that it conjunctively uses in coordination with the District's programs as a private steward of an important public resource. In reliance on these vested proprietary water rights, SJWC has made substantial investments and developed groundwater infrastructure and well capacity sufficient to withdraw approximately 290,000 acre-feet in a single year.

Since July 2016, we have repeatedly corresponded and met with District management and staff[7] in a good faith effort to share our concerns over the adequacy of the GWMP and to suggest a shared governance model among Water Systems that may facilitate the approval of the GWMP by DWR and will improve its efficacy. Specifically, the GWMP fails to acknowledge the proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights.[8] SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater. Those interests specifically include Water Systems.[9] Consequently, the GWMP is not yet a functional equivalent of a GSP as required under applicable law. Even if it were, it holds open the question of future enforcement and will serve to undermine future planning and water supply development.

The Legislature has clearly declared that sustainable groundwater management must respect proprietary rights to groundwater.[10] In fact, it was the expressed intent of the Legislature to "preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater."[11]

SGMA requires management of groundwater within the sustainable yield of the basin.[12] GSPs and functionally equivalent Alternative Plans must have mechanisms to ensure

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[6] Wat. Code § 10735.2(a)(3)-(5)
[7] July 7, 2016 correspondence; 2016 Meetings: September 9, October 7, 12 and 20.
[8] While the Amended Plan acknowledges that pursuant to SGMA, local agencies may not determine water rights in regulating pumping, it does not define the proprietary water rights in the Basin, explain how these rights will be protected, or what the process will be to respect those rights.
[9] Water Code§ 10723.2.
[10] Wat. Code § 113(b)(4); Wat. Code § 10720(b)(4).
[11] Wat. Code § 10720.1(b).
[12] Wat. Code § 10721(v).

sustainability,[13] and the District's GWMP is lacking. If the District adopts a sustainable yield and ultimately corresponding methods to limit groundwater production within the plan area, then the burden of implementing strategies will be borne almost entirely by the sovereign Water Systems. These Water Systems have already dedicated this groundwater to a public use and have accrued proprietary groundwater rights.[14] Either a future amendment to the GWMP will address the subject of plan enforcement and its consistency with these vested rights, or a court is likely to do so. We believe the Water Systems, pursuant to a memorandum of agreement with the District, can collaboratively develop water budgets and curtailment strategies that will provide certainty and enhance efficient use.

Under the District's GWMP, Water Systems within the planning area are forced to guess as to how and when the District will move to adopt provisions to ensure sustainability that may dramatically impact their ability to plan and provide water service to their customers in the future. This uncertainty adds to the lack of regional water supply reliability, and will result in increased costs and waste, and is otherwise contrary to the public interest.

Despite requests from SJWC and other Water Systems, the District has not stated what actions it will take to ensure that sustainability objectives are achieved, or provided assurance that its actions will be consistent with vested water rights and, thus far it has been unwilling to acknowledge that measures that curtail the quantity of available groundwater are best left to the entities with the primary responsibility for distribution of groundwater. **We ask that the District agree now to a shared governance among Water Systems on the question of how any allocation of groundwater or curtailing use be borne and implemented.[15] Only this way can the District ensure that its achievement of a sustainability goal will be consistent with the vested rights cumulatively held by these entities and not resisted by them at a later date.**

Specifically, in reviewing the District's GWMP and comparing it to the standards of a GSP,[16] we wish to point out the following deficiencies:

- **Failure to Describe Basin Conditions in Required Detail.** The District's GWMP fails to describe the current status and conditions of the Santa Clara Sub-basin (Basin) with the level of detail mandated by the SGMA Requirements. The GWMP's multiple maps and other graphics depicting the Basin also fall short of providing the required information and details. These basic deficiencies suggest that the GWMP lacks sufficient baseline data to successfully, and sustainably, manage the Basin pursuant to the SGMA Requirements.

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[13] 23 CCR 354.24 requires that "[t]he [GSP] shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, [and] a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield."

[14] These rights are statutorily protected against loss or diminishment by third-party conduct. Civ. Code § 1007; *see Wright v. Goleta Water District* (1985) 174 Cal.App.3d 71.

[15] A proposal for shared public water system governance by a Memorandum of Agreement is attached hereto.

[16] 23 CCR 358.2(d).

- **No Express Identification of Basin's Beneficial Users.** The District's GWMP fails to specifically identify individual beneficial users of the Basin's groundwater resources, which is required under the SGMA Requirements. Failure to identify specific Basin users also indicates that the District's GWMP lacks important, and required, data about the status of the Basin's groundwater supplies. It also may result in incomplete and an unfair distribution of enforcement burdens and one that fails to honor and protect vested rights.

- **Failure to Include Basin's Projected Water Budget.** To be functionally equivalent, a GWMP must include a basin's water budget under historical, current and future conditions. Although the District's GWMP includes a graphic illustrating the Basin's historical average annual water budget, this graphic does not include the information nor level of detail required under the SGMA Requirements. The GWMP does not include any discussion regarding the quantification of the Basin's current or future groundwater budget nor provide whether there are limitations on expanded or even existing production.

- **GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds.** Although the District's GWMP briefly identifies multiple undesirable results present in the Basin, discussion of these conditions is insufficient to meet the SGMA Requirements. In addition to this deficiency, the District's GWMP also fails to quantify current groundwater conditions and establish adequate minimum thresholds to determine when conditions in the Basin necessitate action. The four "Outcome Measures" in the Amended Plan do not meet the extensive requirements for minimum thresholds and measurable objectives for each applicable sustainability indicator. Failure to satisfy this cornerstone requirement of SGMA means that the District's GWMP is not functionally equivalent.

- **No Identification of GWMP's Data Gaps.** To be deemed functionally equivalent, a GWMP is required to identify both uncertainty and existing gaps in the data that informs the hydrogeological model within the SGMA Requirements. The District's GWMP fails to expressly identify any data gaps within either its monitoring network or the data provided about the Basin, which is a key requirement under the SGMA Requirements.

Although the District's recent draft amendment to its GWMP attempts to address these deficiencies in its 2012 GWMP, it does not fully satisfy SGMA's requirements. Moreover, SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or

amending an existing GWMP as of January 1, 2015.[17] A fair reading of the plain meaning of Water Code § 10750.1(a) suggests that an amended GWMP is not eligible for consideration as an Alternative Plan.

As stated above and in all of our prior communications, SJWC supports sustainable groundwater management. We agree the District is best situated to develop sustainability goals. However, allocating groundwater among interests and requiring curtailment to achieve sustainability goals is a matter that is best left to the vested right holders in the planning area.

Based upon our review of the District's GWMP—and as described above—we do not believe the GWMP qualifies as an Alternative Plan. It does not provide sufficient clarity as to how the GWMP will result in sustainable management or how water budget/allocations will be addressed and any curtailment enforced.

Should the District move forward with submitting its GWMP as an Alternative Plan without first acknowledging the need for shared governance on the key areas of water budget/allocations and curtailment, we are prepared to submit a comprehensive comment letter to DWR detailing the GWMP's lack of functional equivalency as summarized above and stating our opposition to its adoption at this time.

SJWC urges the District Board of Directors to defer adoption of an amended GWMP until its deficiencies are corrected and the shared governance issues identified in this letter are appropriately addressed and incorporated into the plan. SJWC looks forward to the cooperation of the District to resolve these concerns and stands ready to help develop workable solutions that balance the needs and rights of Water Systems with achieving the important basin sustainability goals required by SGMA.

Respectfully,

Andrew R. Gere, P.E.
President and Chief Operating Officer

Cc: Gary Kremen, District Board Member
John Varela, District Board Member
Linda LeZotte, District Board Member
Nai Hsueh, District Board Member
Richard Santos, District Board Member
Tony Estremera, District Board Member
Norma Camacho, District CEO
Jim Fiedler, District COO

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[17] Wat. Code § 10750.1(a)

**MEMORANDUM OF AGREEMENT ("MOA")
BETWEEN PUBLIC WATER RETAILERS AND THE SANTA CLARA VALLEY WATER DISTRICT ("DISTRICT") REGARDING THE IMPLEMENTATION OF THE 2012**

Public Water Retailers are "public water systems" that produce groundwater within Santa Clara County and are required to prepare and file Urban Water Management Plans ("UWMP") with the California Department of Water Resources;

WHEREAS, the District is a multi-purpose water management district with the powers set forth in its authorizing act and is the agency designated as the Groundwater Sustainability Agency ("GSA") for purposes of preparing a Groundwater Sustainability Plan ("GSP") and implementing the California Sustainable Groundwater Management Act ("SGMA") within Santa Clara County for the Santa Clara and Llagas subbasins ("subbasins");

WHEREAS, since the 1930's, the District's water supply strategy has been to maximize conjunctive use, the coordinated management of surface and groundwater; [1]

WHEREAS, Tables ES-1 and ES-2 of the District 2012 Groundwater Management Plan ("2012 GMP") acknowledge the shared responsibility and cooperation with others that is required to effectively manage groundwater within these areas;[3]

WHEREAS, Section 2.2 of the 2012 GMP states that "[n]early half of the water used in Santa Clara County is pumped from groundwater, one of the county's greatest natural resources," and that UWMP of the public water systems demonstrate that these water retailers show a continued reliance upon groundwater to meet the needs of their customers;[4]

WHEREAS, Section 1.3 of the 2012 GMP reflects the District's intention to be a regional partner in groundwater management;

WHEREAS, Section 4.1.4 of the 2012 GMP acknowledges that the subbasins in Santa Clara County are not adjudicated and the District does not legally control the operation of groundwater wells or the amount of groundwater that wells can produce;

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[1] 2012 Groundwater Management Plan, ES-1.

[3] 2012 Groundwater Management Plan, Tables ES-1 and ES-2.

[4] 2012 Groundwater Management Plan, Section 4.1.5 and 1.3.

WHEREAS, a key component of the water supply reliability performance under the 2012 GMP and approved UWMP depends on the cooperation between the District and its water retailers, which is "critical during times of shortage;"[5]

WHEREAS, the District resolved to continue and enhance further groundwater management partnerships;[6]

WHEREAS, the District has announced its intention to submit its 2012 GMP as an Alternative Plan in lieu of a GSP in compliance with SGMA, and to qualify Alternative Plans must fulfill the objectives of a GSP;

WHEREAS, groundwater management pursuant to SGMA must be consistent with Section 2 of Article X of the California Constitution and nothing within SGMA may modify the priorities of common law water rights[7] and the statutory protection of those rights;[8]

WHEREAS, SGMA requires GSAs to consider the interests of beneficial uses and users of groundwater within the plan area and those "interests" specifically include public water systems[9]; and

WHEREAS, SGMA provides that a GSA may implement a plan pursuant to legal agreement in a manner consistent with Recommendation 7-5 of the District 2012 GMP, pursuant to an MOA.

NOW THEREFORE, the Parties hereby agree that a Water Rights Committee with the foregoing powers and authority shall be formed to guide implementation of the 2012 GMP as an Alternative Plan or a GSP as either the 2012 GMP or GSP may be amended and approved by DWR from time to time.

1. Water Rights Committee.

A "Water Rights Committee" ("WRC") is hereby established by written agreement among the signatory Water Retailers and the District. This WRC will wield the responsibility for coordinating and facilitating implementation of the 2012 GMP or a GSP (collectively hereinafter the "SGMA Plan") with regard to the following subjects in the manner described:

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[5] 2012 Groundwater Management Plan, Section 4-1-4 at p. 4-5.
[6] 2012 Groundwater Management Plan, Recommendation: 7-3(5) at pp. 7.4-7.5
[7] Water Code § 10720.5.
[8] See. e.g. Civil Code § 1007, Water Code §§ 106, 106.5; Public Utilities Code § 851.
[9] Water Code § 10723.2; Section 354.10 of the GSP Regulations ("Notice and Communication").

(a) Curtailment/Apportionment. In the event that either the District determines that curtailment of groundwater production or an apportionment of groundwater (allocation) within the subbasins is required to avoid causing undesirable results under a SGMA Plan, then:

(i) The District will notify the WRC in writing of the need for a curtailment/apportionment plan to avoid causing undesirable results;

(ii) At any time on its own initiative, the WRC may, or within twelve (12) months of its receipt of written notice from the District, the WRC will prepare a curtailment/apportionment plan;

(iii) The methodology to curtail existing extractions or apportionment of groundwater shall be developed by the WRC in its complete discretion;

(iv) Any WRC curtailment/apportionment plan shall be presented to the District for its consideration and inclusion in any SGMA Plan;

(v) The District will accept and include the WRC curtailment/apportionment plan developed by the WRC in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC allocation/curtailment plan, including proposed mitigation measures, do not provide reasonable assurance that "undesirable results" will be avoided;

(vi) In the event the District disagrees with the WRC curtailment/apportionment plan pursuant to (v) above, the District may seek to set aside the adoption of the WRC plan pursuant to Code of Civil Procedure (CCP) § 1085;

(vii) The Parties will exercise good faith and reasonable efforts to coordinate the implementation of any interim measures required to protect against "undesirable results" during the WRC's development of a curtailment/apportionment plan;

(viii) If after twelve (12) months from the date of the District's notice required in paragraph (a)(i) above, the WRC fails to complete a curtailment/apportionment plan and present the plan to the District for approval, then the District may prepare its own curtailment/apportionment plan. If the WRC disagrees with the District's plan, then the WRC may seek to set aside the adoption of the District's curtailment/apportionment plan pursuant to CCP § 1085.

(b) Transfer and Carry-Over. If water allocations are created pursuant to section 1(a) of this MOA, the WRC may, in its complete discretion, develop a transfer and carry-over plan further implementing a SGMA Plan that will establish rules and conditions for the transfer, conservation, and carry-over of any unused allocation between and among the public water systems.

(i) The WRC will notify the District in writing of its intent to prepare a transfer and carry-over plan, and thereafter the WRC will exercise good faith and reasonable diligence in preparing a transfer and carry-over plan;

(ii) The methodology for transfer and carry-over of any allocations shall be developed by the WRC in its complete discretion, subject to the express requirement that the transfer and carry-over plan will not cause or threaten to cause unmitigated "undesirable results;"

(iii) The District will accept and include a WRC transfer and carry-over plan in the SGMA Plan unless, after a good faith evaluation, the District finds that the WRC transfer and carry-over plan, including proposed mitigation measures, do not provide reasonable assurances against causing or threatening to cause "undesirable results;"

(iv) In the event the District disagrees with the WRC transfer and carry-over plan pursuant to (b)(iii) above, the District may seek to set aside the adoption of the WRC plan pursuant to CCP § 1085.

(c) Storage and recovery of imported water. The District will submit any plan that will limit or condition the ability of public water systems to import foreign (out of County, out of watershed) supplemental water into the subbasins for storage and recovery by the public water systems to the WRC for its review and consideration.

(i) The District will provide written notice to the WRC of its intent to prepare a storage and recovery plan;

(ii) The storage and recovery plan shall not impair the operating ability of a public water system or cause or threaten to cause "undesirable results;"

(iii) The District will seek the WRC's approval of any storage and recovery plan prior to inclusion in any SGMA Plan;

(iv) If the WRC disagrees with the District's plan, then the WRC may seek to set aside the District's adoption of its storage and recovery plan pursuant to CCP § 1085;

(v) Alternatively, if the District has not issued a notice of its intention to prepare a storage plan pursuant to (c)(i) above, the WRC may independently develop a plan for the storage and recovery of imported water to enhance local water supply reliability. The WRC will present any WRC plan for the storage and recovery of water to the District for inclusion in a SGMA Plan. The District will accept and include the WRC storage and recovery plan unless, after a good faith

evaluation, it finds that storage and recovery of imported water will cause or threatens to cause "undesirable results" or will directly interfere with existing District operations or replenishment programs;

(vi) The WRC may challenge the District's decision not to include the storage and recovery plan in a SGMA Plan pursuant to CCP § 1085.

(d) Well Permits / Well Location. The District will not restrict or seek to regulate a public water system's ability to produce groundwater for public consumption by an existing, replacement or new well unless there is a direct and immediate threat to the health, safety and welfare that is separate, discrete and distinguishable from groundwater production in the subbasin as a whole. If the District determines in its discretion that such an immediate and direct threat to the health, safety, and welfare of the community exists, it may act by an urgency ordinance to reasonably condition the new wells but only for so long as the actual emergency condition exists. The District will exercise good faith and reasonable efforts to coordinate with the WRC to develop a consensus on reasonable conditions to protect public health and safety and to avoid undesirable results. The WRC may challenge the District's plan to limit or condition well permits and well location pursuant to CCP §1085.

2. Water Rights Committee Representation.

The WRC shall be comprised of representatives appointed by each of the Public Water Retailers and drawn from its membership.

Voting: Except as specifically otherwise provided herein, the vote of a majority of the members of the WRC present at any regular, adjourned or special meeting shall be sufficient to pass or act upon any matter properly before the WRC, and each member of the WRC shall have one vote.

Groundwater Weighted Voting: Upon the call and request of any WRC member, present and able to vote, and a quorum being present, a weighted voting formula shall apply for any vote to be taken by the WRC, with each member having one or more votes based upon the groundwater pumping set forth in Exhibit A. In order for the WRC to take action under the provisions of this section two requirements must be fulfilled:

a) A majority of the votes weighted by groundwater pumping must be cast in favor of the action, provided that not less than two member agencies vote in favor of the action; and

b) A majority of the members vote in favor of the action. In the event a simple majority vote on a question has previously been taken, and a weighted vote is subsequently called; a roll call vote will be taken that tabulates both the weighted vote and the members voting. The vote weighted by a majority of

those voting representing a majority of the groundwater pumping shall supersede the previous simple majority vote, provided that the vote of a single member may not defeat an action.

Groundwater Pumping: For the purposes of determining the weighted vote of water retailers or the At-Large representative, the weighted vote by groundwater use shall be based on the historical groundwater pumping range set forth in Exhibit A, which may be updated annually by the WRC to reflect the actual increase in a WRC member's groundwater use.

The Public Water Retailers agree to form the WRC by January 15, 2017.

(a) Quorum. A majority of the voting power of the WRC shall constitute a quorum for the transaction of affairs and the approval or disapproval of plans and actions set forth in paragraph 1(a)-1(d) above. Any action or recommendation of the WRC shall be transmitted to the District in writing.

(b) Organizational Meeting. At its first meeting each year, the WRC shall elect a chairperson and vice-chairperson from its membership. It shall also elect a secretary and treasurer as may be appropriate, and the positions need not be from its membership.

(c) The WRC shall conduct its business in accordance with Robert's Rules of Order and the California Open Meetings Law, and shall establish further governing rules and procedures as may be necessary and convenient for the WRC.

4. Binding on All Plans.

The commitments set forth in this MOA shall apply to any SGMA Plan.

5. Effective Date.

The MOA is effective upon execution of the Parties.

EXHIBIT A

Method: All Retailers Represented with Weighting except that use <400 AFY[1].
One At-Large representative to be appointed from among parties that use <400 AFY.

Retailer	# of Votes	Range in AF		# of Votes
San Jose Water Company	10	55,800	62,000	10
Santa Clara	3	49,600	55,800	9
Great Oaks[2]	3	43,400	49,600	8
Gilroy	2	37,200	43,400	7
Morgan Hill	2	31,000	37,200	6
Cal Water	1	24,800	31,000	5
Sunnyvale	1	18,600	24,000	4
San Jose	1	12,400	18,600	3
Mountain View	1	6,200	12,400	2
		0	6,200	1
Total				

: = Total GW/#votes
Total GW = 155,000
otes = 25

GROUNDWATER USE IN AF

	2010 UWMP	% Total
San Jose Water Company	60,500	39.0%
Santa Clara	14,800	9.5%
Great Oaks	12,300	7.9%
Gilroy	8,500	5.5%
Morgan Hill	7,800	5.0%
Cal Water	5,200	3.4%
Sunnyvale	1,200	0.8%
San Jose	400	0.3%
Mountain View	400	0.3%
Stanford	200	0.1%
Independent Santa Clara	9,800	6.3%
Independent Coyote Valley	5,000	3.2%
Independent Llagas	28,900	18.6%
Total	155,000	100.0%

[1] SCVWD 2010 UWMP
[2] Great Oaks rounded up to 12,400

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Michele King

From:	Katja Irvin [katja.irvin@sbcglobal.net]
Sent:	Tuesday, November 22, 2016 12:13 PM
To:	Clerk of the Board; Barbara Keegan; Vanessa De La Piedra
Cc:	'Banerjee Kakoli'; 'Mike Ferreira'
Subject:	November 22, 2016 SCVWD Board Agenda Item 2.7
Attachments:	Sierra Club Comments on 2016 GWMP 112216.pdf

Dear Melissa, Barbara and Vanessa,

The Sierra Club requests the subject agenda item be continued to December 5, 2016 to allow stakeholders more time to make complete comments. Unless a two-week delay will result in an important missed deadline for the District, we feel this is a reasonable request that should be granted for stakeholders and the public to adequately review the Groundwater Management Plan (GWMP). Ten days is not adequate time to review this 238-page plan.

On top of that, my Mom was admitted to the hospital last Friday so I did not have time to complete my comments this weekend. This morning the doctor called to tell me she has stomach cancer so I'm on my way back to the hospital now. I'm sorry I won't be able to attend the meeting tonight.

I'm attaching some initial comments from the Sierra Club. I hope to have time to submit some complete comments if the item is continued.

Thank you for your consideration.

Katja Irvin
Water Committee Chair
Sierra Club Loma Prieta Chapter

Sierra Club Loma Prieta Chapter
Celebrating 80 years of protecting the planet

SIERRA CLUB

3921 East Bayshore Road, Suite 204, Palo Alto, CA 94303
loma.prieta.chapter@sierraclub.org | TEL - (650) 390-8411 | FAX - (650) 390-8497

November 22, 2016

RE: Sierra Club Comments on SCVWD 2016 Groundwater Management Plan

The GWMP does not adequately include the District's mission to provide water for the environment. With "One Water" the District is moving in the direction of integrated planning, and hopefully away from isolated plans that ignore important aspects of watershed-based planning. Specifically:

1. The Basin Sustainability Goals and Strategies (pg. ES-5) need to be updated to include the relationship between ground water and stream flows. **For example,** "Groundwater supplies are managed to optimize water supply reliability, minimize land subsidence, **and provide adequate flow to support aquatic species in local streams**."
2. To support the environment, strategy #4 (pg. ES-5) should acknowledge the updated goal. For example, **"Work with regulatory and land use agencies to protect recharge areas,** promote natural recharge, prevent groundwater contamination, **and protect surface stream flows from over-pumping."**
3. Outcome Measures (pg. ES-6) should include monitoring and stream flow goals that are adequate to restore populations of species listed under the Endangered Species Act. Section 2.2.3 on pg. 2-14 says "Surface water flow data can be used to evaluate which reaches of streams are gaining or losing streams with regard to groundwater. However, the District has not performed a comprehensive evaluation of the data for this purpose." The District should plan to do this comprehensive evaluation for a near-term GWMP update.
4. Under Next Steps (pg. ES-6) a new action should be added to develop modeling and monitoring methods to protect and restore aquatic species.

The 2016 GWMP should be updated in the near term (sooner than five years) to include environmental goals, environmental analysis, and environmental indicators.

Specific Comments

5. **This sentence, "Any significant policy or investment decisions would be developed and** evaluated in consultation with local stakeholders, as the District does in current planning **and budgeting processes." on page ES-6 should be updated. "Stakeholders" should be replaced with "water retailers" since these are the only stakeholders involved in significant** policy or investment decisions.
6. The maps in Chapter 2 could be improved the utility of the GWMP.

- Provide more contrast between the Confined Area and the Recharge Area in Figure 2.1 (pg. 2-1). Also, use a darker, stronger line style to show the Approximate Extent of Confined Area. This also applies to and subsequent similar figures.
- If possible, remove legend items for confined areas and recharge areas from other figures because they are not visible (for example, Figure 2.15 on pg. 2-16). The legend is confusing.

Stanford University SUSTAINABILITY AND ENERGY MANAGEMENT

November 22, 2016

Via Email Only (board@valleywater.org)

Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Subject: **Draft 2016 Groundwater Management Plan**

Dear Members of the Board,

Stanford University ("University") appreciates the opportunity to provide comments on Santa Clara Valley Water District's ("District") Draft 2016 Groundwater Management Plan ("GWMP"). As a stakeholder that has for many years been an active participant in the District's groundwater management efforts, the University has a few concerns regarding the GWMP and the District's related efforts to comply with and implement the Sustainable Groundwater Management Act ("SGMA).

1. **The GWMP needs to be more specific with respect to the process the District will use to evaluate new SGMA authorities and develop criteria for the exercise of those authorities.**

The GWMP vaguely states that the District plans to engage and collaborate with stakeholders in a process to evaluate new SGMA authorities and develop criteria for the exercise of those authorities. The GWMP does not provide any details on the process envisioned by the District or the level of stakeholder involvement in that process. The GWMP should include more detail about the collaborative process and a timeline that the District will follow in evaluating new SGMA authorities and developing criteria and processes for the exercise of those authorities. The details should include, among other things: (a) the type of processes to be used by the District (e.g., public hearings, workshops, etc.); (b) the type of involvement that stakeholders will have in the process; and (c) dates for events to occur as part of the process. The processes should include meetings and workshops with stakeholders regarding the implementation of SGMA-related authorities and any proposed measures that are authorized by SGMA rather than the District's enabling statute. These additional details are appropriate so that all stakeholders can fully and properly participate in the process.

2. **The District's exercise of authority, including under SGMA as a groundwater sustainability agency, must comply with all applicable laws and cannot alter water rights.**

As acknowledged in the GWMP, SGMA does not (and cannot) determine or alter water rights, including groundwater rights. (See, Wat. Code § 10720.5(b).) Thus, the District's exercise of any SGMA authorities must be done in a manner that does not alter water rights. This requirement should be a primary focus and concern of the District as it considers, develops and implements any new SGMA authorities under the GWMP. In addition, the District must comply with Proposition 218 and Proposition 26 in the implementation of its GWMP.

WATER RESOURCES & CIVIL INFRASTRUCTURE GROUP
327 Bonair Siding, Stanford, CA 94305-7272 T 650-725-8081 F 650-723-3191

Thank you for your attention to this matter. Please contact me at (650) 725-3400, if you have any questions or comments.

Sincerely,

FOR

Tom W. Zigterman, P.E., D.WRE
Director - Water Resources & Civil Infrastructure
Stanford University, Department of Sustainability and Energy Management

Cc: Ms. Vanessa De La Piedra, P.E., Groundwater Monitoring and Analysis Unit (gwmp@valleywater.org)

WATER RESOURCES & CIVIL INFRASTRUCTURE GROUP
327 Bonair Siding, Stanford, CA 94305-7272 T 650-725-8081 F 650-723-3191

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

November 22, 2016

Vanessa De La Pierda
Santa Clara Valley Water District
5700 Almaden Expressway
San Jose, CA 95120

Dear Ms. De La Piedra,

The Santa Clara Valley Open Space Authority (Authority) is a California special district whose jurisdiction includes over 1,000 square miles of Santa Clara County, including the cities of Milpitas, Santa Clara, San Jose, Campbell and Morgan Hill. The Authority permanently protects open space, natural areas and agricultural lands through land acquisition, conservation easements and partnerships. To date, the Authority has partnered with the County, cities, other public conservation agencies and non-profit conservation organizations to protect over 20,000 acres of open space and agricultural land and operates a system of open space preserves for multi-use recreation. In 2014, the Authority completed the Santa Clara Valley Greenprint[1] as a strategic plan to guide its work for the next 30 years. The Greenprint analyzed biodiversity, water resources, working farms and ranches, recreation, and viewshed criteria throughout the Authority's jurisdiction. In 2015, our two agencies entered a formal Partnership Agreement to work on projects and initiatives that increase the pace and scale of watershed conservation in the Santa Clara Valley, advancing the goals of both agencies. We look forward to continued collaboration with the District and partnering on specific projects that support the *Basin Sustainability Goals* as articulated in the Draft Plan.

The goals include:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from contamination, including salt water intrusion.

The Authority respectfully provides the following comments on the District's 2016 Draft Groundwater Management Plan (Draft Plan).

Comment #1.

1.4.5 Relation to Other District Programs and Plans

The Authority recommends including reference to the District's One Water Plan effort. This effort is discussed elsewhere in the Draft Plan, but not highlighted here. Since this effort represents the

[1] Santa Clara Valley Open Space Authority. 2014. *The Santa Clara Valley Greenprint: A guide for protecting open space and livable communities.* San Jose, CA
http://www.openspaceauthority.org/about/pdf/SCVOSA.Greenprint.FINAL.March2014_RevisedWithCovers28May2014.pdf

6980 Santa Teresa Blvd
Suite 100
San Jose, CA 95119
408.224.7476 T
408.224.7548 F
openspaceauthority.org

District's vision of integrated resource management, we think it will be a key guiding document for integrating innovative strategies to help the District meet its sustainability goals.

Comment #2.

1.5.2 Land Use Agencies, 1.5.3 Local State and Federal Agencies and 1.5.4 Stakeholders

The Draft Plan focusses solely on agencies with permit authority, land-use planning authority, well owners, and land owners. The Draft Plan should also reference proactive resource conservation partners like the Authority, County Parks, and Resource Conservation Districts who can and will play a critical role in implementing Strategy 4 (e.g. protect recharge areas, promote natural recharge, and prevent groundwater contamination). We suggest adding text to this section that specifically calls out local conservation partners (public and private) and the key role they can play in proactive and voluntary collaboration with the District to implement the Draft Plan.

Comment #3.

4.1.2 Groundwater

"The groundwater subbasins provide multiple benefits to residents and businesses in Santa Clara County. Although most of the groundwater pumped is a result of District managed recharge programs, ***the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams (natural groundwater recharge).*** *In addition, the groundwater subbasins serve as an* ***extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells.*** *The groundwater subbasins* ***also provide some natural filtration of surface water as it percolates through the soil and rock.*** *Unlike surface water, most groundwater in the county can be used for drinking water without additional treatment. Lastly, the* ***groundwater subbasins provide water storage****, allowing water to be carried over from the wet season to the dry season and even from wet years to dry years."*

This general introduction to the role groundwater plays in the overall water supply paradigm directly supports the underlying assumptions behind the current effort that the District and Authority are collaborating on in the Coyote Valley. This work is founded on the four key principals articulated in this paragraph: (a) that natural recharge is a small, but cost-effective and critical component of the overall recharge/supply equation; (b) that increasing recharge through the natural landscape in the Coyote Valley is a cost-effective tool that would benefit local wells and provide outflows into both the Santa Clara and Llagas basins; (c) that restoration of meadows, wetlands, and riparian floodplains that enable stormwater to slow, spread, and sink could result in improvements to both surface and groundwater quality; and (d) that our existing basins are the most cost-effective storage options we have and enable our community to "bank" water locally to mitigate inter and intra annual supply fluctuations.

While the current work the Authority and the District are collaborating on directly address opportunities related to a, b and c above, current provisions in three of the District's Coyote Creek water right licenses have the potential to impact the amount of storage available in the Coyote subbasin. License #7211, #7212, and #10607 all contain the following language, "The storage and diversion facilities shall be so operated under this license as to cause as nearly as practicable the same annual percolation between Madrone and Coyote as would have occurred in a state of nature without the existence of said facilities." This language has been interpreted by District staff as a constraint on restoring natural

recharge and groundwater storage in the Coyote Valley and potentially leading to a conflict between opportunities to maximize existing storage and meet key provisions in existing water right licenses. It is our understanding that the District is currently in the process of modifying these licenses, and we suggest that requesting modifications to this language could increase the District's operational flexibility in meeting their sustainable groundwater goals and implementing the related strategies.

Comment #4.

4.3 Conjunctive Water Management

*"**Local groundwater resources make up the foundation of the county's water supply,** but they need to be augmented by the District's comprehensive water management activities in order to reliably meet the needs of county residents, businesses, agriculture, and the environment. **These activities include managed recharge of imported and local supplies** and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling."*

As "local groundwater resources make up the foundation of the county's water supply," the Authority recommends that the Plan includes language about the potential for increased natural recharge through ecological system restoration or enhancement as an integral component of developing a sustainable groundwater management plan.

Comment #5.

Figure 4.5 Groundwater Budget for the Santa Clara and Llagas Subbasins (2003-2012) & Figure 4.7 Projected Future Groundwater Demands (AF).

Figure 4.5 and the associated text on water budgets illustrates the unique opportunities related to the Coyote Valley subbasin. According to these figures, nearly 20% (2500-AF/yr) of the recharge in the Coyote Valley subbasin is a result of "natural recharge". This average fluctuates based on climatic conditions as well as land-use conditions; recent estimates of natural recharge in the Coyote Valley subbasin range 500-AF in 2013 to a near average 2,400-AF in 2014 (Santa Clara Valley Water District, 2015). Of the total water recharged in this subbasin approximately 4,500-AF/yr leaves as subsurface flow into the Santa Clara and Llagas basins, supplementing managed recharge in these larger basins. Moreover, this section indicates that unlike the Santa Clara[2] and Llagas basins that appear in balance, the Coyote Valley basin shows a 500AF/yr deficit in storage. This deficit is particularly important due to the scale (e.g. hundreds of AF/yr) and Table 4.7 shows future demand curves increasing from the current level of 10,500AF/yr to 12,000AF/yr by 2020, 14,000AF/yr by 2030, and 16,000AF/yr by 2040. **To put these numbers in perspective, recent analysis of gauge data on Fisher Creek at Laguna Avenue and at Monterey Avenue suggest that significant opportunities for stormwater capture and recharge exist and that the potential quantity of water is meaningful at the scale of the current deficit (500AF) and future increased demand.** For example, the Fisher Creek gauge at Laguna Avenue shows nearly

[2] The Draft Plan shows that the Santa Clara basin storage is increasing by approximately 2000AF/yr. It is important to note that flow from the Coyote Valley subbasin into the Santa Clara subbasin is estimated at 4,500AF/yr, over 2X the annual increase. This suggests the importance of flow from the Coyote Valley subbasin into the Santa Clara subbasin for maintaining the balance now and into the future.

1,500AF of water flowing past this location during an 11-day period in March of 2016 – on both ends of the March 7 and 14 storms. The gauge at Monterey shows nearly the same amount of water moving through the system during that period. If even 50% of that water could have been captured and recharged through a series of appropriately sited floodplains, depression, and swales, that would have resulted in upwards of 750AF of recharge. This stormwater runoff represents a major lost opportunity, and the Authority recommends that opportunities like this be identified in the Draft Plan.

Comment #6.

4.5 Future Demands

"The UWMP recognizes that the near-term and potentially long-term water demand may be considerably affected by the recent and unprecedented statewide drought conditions of 2012 to 2016. This event has already affected demand as the public has changed attitudes and as water use restrictions have been put in place. Some of the water use efficiency successes and changed behavior will last into the future. But if the past is a guide, some rebound of water use will likely occur within a few years of removing water use restrictions. This drought and the local and statewide efforts to date may likely lead to new policy or technological enhancements that may reduce future demands in ways that cannot be currently predicted."

The Authority supports the need to plan proactively for drought. While this statement addresses the demand side of the equation, we suggest additional text be added to explicitly focus on the supply side of this equation. Prolonged drought has already significantly affected water imports into the District's service area and they are expected to become less reliable as the climate continues to change. The Draft Plan (Chapter 4) details current and future supply and demand, but does not appear to adequately address the uncertainty related to climate change forecasts and potential for long-term interruptions in water imports. The Draft Plan would benefit from greater emphasis and analysis of climate change (e.g. in terms of sea level rise and salt water intrusion and reductions in natural and managed recharge). **The Draft Plan should clearly acknowledge the role that natural landscapes and natural recharge can play in providing a buffer against reduced imports and drought.** The Authority recommends that the Draft Plan include strategies for increasing the operational storage capacity of each basin, specifically the Coyote Valley subbasin (see Comment #5 above) as insurance in the face of climate change and anticipated future prolonged droughts.

Comment # 7

5.1 Sustainable Management Criteria

Board Water Supply Objective 2.1.1: Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion.

Objective 2.1.1 is described in the Draft Plan as one of two key criteria for sustainable management. **The Authority recommends that the District consider enhancing recharge of local stormwater in the Coyote Valley subbasin as a key strategy for meeting multiple criteria including both optimizing reliability and minimizing land subsidence and salt water intrusion.** Existing modeling illustrates the

value of subsurface outflow from Coyote Valley into the Santa Clara Plain. In addition, modeling by Russo et al (2014)[3] further highlights the value of maximizing recharge in the Coyote Valley subbasin and its potential effect on land subsidence and salt water intrusion. This research showed that while simulated recharge projects sited near the coast or lower in the watershed helped to reduce sea water intrusion more rapidly, they also resulted in increased losses to the ocean. In contrast, projects placed farther inland resulted in more long-term reductions in sea water intrusion, less recharged groundwater flowing to the ocean, and more groundwater available for potential extraction.

Comment #8

The Authority commends the District for including Strategy 4 in the Draft Plan which calls for working with local government to protect groundwater recharge areas and support low impact development - "Since the 1950s, land use in the Santa Clara Plain has changed from largely rural and agricultural to a highly developed urban area. The increased amount of land covered by impervious materials has increased surface water runoff and reduced natural recharge. Although not as urbanized as the Santa Clara Plain, the Llagas Subbasin serves the growing cities of Morgan Hill and Gilroy, and significant development has been considered in the Coyote Valley. This strategy calls for working with land use agencies to maximize natural recharge by protecting groundwater recharge areas and supporting the use of low-impact development. This includes the development of technical studies, participation in policy development, and coordination on proposed development."

The Authority also recommends that Strategy 4 include reference to working closely with open space and resource conservation agencies to identify opportunities to maximize recharge through habitat restoration or other ecological enhancement projects that could also restore/increase local water capture.

Comment #9

5.4 Outcome measures- *"This section describes key performance measures in meeting the following sustainability goals: (1) Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence; and (2) Groundwater is protected from contamination, including salt water intrusion."*

Given the GWMP recognizes that increased urbanization reduces natural recharge and increases risk of contamination, the Authority recommends the Draft Plan set goals and key performance measures that address basin urbanization which could reduce natural groundwater recharge or result in future groundwater contamination.

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[3] Russo, T.A., Fisher, A.T., Lockwood, B.S. (2014) Assessment of Managed Aquifer Recharge Potential and Impacts using GIS and Numeric Modeling. Groundwater. 12213.

Comment #10

6.1.3 Protection of Natural Recharge

"The District's managed recharge program augments natural recharge since natural replenishment is insufficient to meet groundwater demands. However, protecting natural recharge capacity is also important. Natural recharge is defined here as any type of recharge not controlled by the District, including: rainfall, subsurface seepage from surrounding hills, net irrigation return flows, net leakage from water distribution systems, storm drains, sewer lines, and septic systems, and net seepage into the groundwater basin. Natural recharge to deep drinking water aquifers is about 55,000 AF per year on average based on estimates from 2003 to 2012. In 2015, a drought year, natural recharge was estimated to be 39,000 AF...The preservation of open space supports agriculture and natural recharge capacity...."

The Authority strongly supports strategy 6.1.3 and requests the District elevate and implement this strategy through its partnerships with other public and private partners. Preservation of open space and enhancing or restoring conditions for natural recharge provide multiple benefits well beyond sustainable groundwater management and are generally cost-effective. These activities generally do not require "gray" infrastructure such as pipes, pumps, and other facilities that have a capital cost, depreciate over time, and have significant maintenance costs. Green infrastructure such as natural drainage channels/streams, floodplains, meadows, etc. can be used to spread and sink stormwater into the landscape. Green infrastructure has minimal/no operational costs and the resource appreciates over time and provides a host of other benefits to the community (e.g. flood risk reduction, improved water quality, ecosystem uplift, carbon sequestration, etc.)[4]. These co-benefits further increase the economic value of investments in land conservation for water resource protection.

Comment #11

#8. 6.1.4.4 Pricing Policies

The Authority recommends the District evaluate the appropriateness of a net-metering system for incentivizing landowners to develop facilities (natural depression, ponds, basins, etc.) that can increase natural recharge of local stormwater. Dr. Andy Fisher at U.C. Santa Cruz is currently piloting a net-metering system in the Pajaro Valley with the Pajaro Valley Water Management Agency, the Resource Conservation District of Santa Cruz County and agricultural landowners. The program is focused on participants that can recharge over 100 AF/yr and provides a pricing structure for rebates that accounts for water that is actively recharged and provides discounts on pumping fees. This type of incentive based approach could be a valuable component of any new groundwater pumping fees levied through SGMA. The Authority would like to partner with the District to pursue Conservation Innovation Grant

[4]Batker, D., Schwartz, A., Schmidt, R., Mackenzie, A., Smith, J., Robins, J. 2014. Nature's Value in Santa Clara County. Earth Economics, Tacoma, WA & the Santa Clara Valley Open Space Authority, San Jose, CA.
http://www.openspaceauthority.org/about/healthylandshealthyeconomies.html

funding from the NRCS to explore this and other opportunities to incentivize multi-benefit water resources projects.

Comment #12

6.1.6.3 Planning to Meet Future Needs

The Authority recommends that under this section the Draft Plan discuss climate change in more detail, including projected impacts to Santa Clara County. See comment #6 above.

Comment #13

6.1.7 Asset Management

"Maintaining the integrity of the District's existing infrastructure is essential for water supply reliability. This includes maintaining recharge facilities and all District facilities, such as reservoirs, treatment plants, and conveyance and distribution infrastructure. The District maintains a rigorous asset management program to optimize asset renewal strategies and minimize the total cost of owning assets while providing expected service levels and operating at an acceptable level of risk. The program seeks to reduce unplanned infrastructure failure and service disruptions and improve reliability of water supply infrastructure. The program helps to optimize asset lifecycle costs, enable accurate financial planning to sustainably deliver services, and capture and transfer asset-specific knowledge."

The Authority strongly recommends that the District include natural capital (e.g. watersheds, stream corridors, unconfined recharge areas, wetlands, undeveloped floodplains etc.) as essential infrastructure assets for water supply reliability. These natural capital assets provide considerable services that are typically provided more efficiently and at a lower cost than engineered alternatives. The Authority requests that the District consider investments in the protection, management, and restoration of natural capital as a part of its water supply asset management strategy. The District should also consider partnering with public and private landowners on programs or projects that conserve or restore these assets.

Comment #14

6.3.4 Watershed Management

"Drawing from detailed existing programs and plans, One Water seeks to find the nexus between these three mission components for new opportunities in integrated water resources management. One Water does not replace the substantial existing planning in place by the District's Water Utility Enterprise and the Watersheds Division but instead looks for opportunities to further protect and enhance water resources. The ***One Water Plan is a long-term endeavor that seeks to build up to long-term improvements in water resources management and watershed conditions****. One Water will operate under the current commitments, regulations, and existing restrictions and challenges that drive District operations and day-to-day work. This means that not all strategies will be practicable and not all goals and objectives can be carried out simultaneously. In the end, however,* ***the established framework called***

***out in the One Water Plan identifies a roadmap for integrated water resources management for the future.** Not all District activities can be integrated, nor all activities managed under One Water, but all types of water will be considered in building upon past successes to manage these valuable resources as One Water."*

The Authority commends the District for its development of One Water as a roadmap for integrated water resource management. Understanding that not all of One Water's goals, objectives, or strategies may be currently practicable- the Authority recommends that that groundwater management plan addresses how it can implement One Water components that *are* currently feasible, and how it plans to address commitments, regulations, and existing restrictions and challenges that are currently preventing the District from fully implementing One Water's approach to integrated water resource management.

In closing, the Partnership between the Authority and District is based on the understanding that protection and restoration of watershed lands not only ensures safe and reliable water resources, but also bolsters the resiliency of the ecosystems and human communities they support. The Authority is currently working with the District to assess the contribution of natural landscapes to water resource reliability, and opportunities to increase these services through ecological restoration and enhancement in the Coyote Valley. This work recognizes watershed lands as natural assets that can be managed to achieve water resource protection and reliability goals. The above comments are offered in this spirit of partnership. The Authority commends the District in its effort to achieve sustainable groundwater management and will continue to work closely with the District to implement integrated water resource management approaches and strategies.

Sincerely,

Andrea Mackenzie

Andrea Mackenzie
General Manager

Cc: Norma Camacho, Chief Executive Officer (Interim)
Jim Fiedler, Chief Operating Officer: Water Utility Enterprise
Santa Clara Valley Water District Board of Directors
Santa Clara Valley Open Space Authority Board of Directors

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A3. District Response to Public Comment Letters on the Draft GWMP

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Andrew Gere
President and Chief Operating Officer
San Jose Water Company
110 W. Taylor Street
San Jose, CA 95110-2131

Subject: Response to San Jose Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Gere:

Thank you for the San Jose Water Company (SJWC) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the SJWC comment letter are summarized below, along with the District response.

Water Rights and Potential Pumping Regulation

The SJWC comment letter states that "the GWMP fails to acknowledge proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights." The letter goes on to request that the District agree to share governance with public water systems with regard to how any groundwater allocation or curtailment is implemented.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results while recognizing related limitations. The GWMP clearly acknowledges that property owners and pumpers have rights to use groundwater, and that local agencies are not authorized to make a binding determination of water rights. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of

[1] California Water Code §§10720.5(b) and 10726.8(b)

groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

Chapter 8 of the GWMP (Next Steps) includes Recommendation 6a to "Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary." This analysis will consider related limitations with regard to existing water rights and land use authority.

The District was formed in 1929 to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use. This includes municipal, domestic, industrial, and agricultural pumpers, as well as private water companies like SJWC. The District's existing, comprehensive groundwater management framework has been successful in adapting to changing needs, and has maintained sustainable conditions over many decades. This framework includes well-established and clearly defined governance structure and authorities under the Santa Clara Valley Water District Act (District Act), effective conjunctive water management programs, and partnerships with water retailers and others.

The GWMP documents this framework, including the many ways we collaborate with retailers, such as through Urban Water Management Plan development and shortage response. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges.

Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Deficiencies Identified by SJWC

The comment letter claims the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). The District does not agree with this representation, for the reasons explained below. Importantly, a direct comparison to specific elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components. Instead, it must demonstrate functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[2] and that the Alternative achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

[2] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2

1) Failure to Describe Basin Conditions in Required Detail

There is no definitive level of detail required for Alternatives. As noted above, agencies submitting an Alternative must demonstrate functional equivalence to certain articles of the GSP Regulations. Functional equivalence is required to assure DWR, basin stakeholders, and the public that basin conditions are understood to the degree necessary to make informed decisions and take action to ensure sustainability. GWMP Chapters 2, 3, and 4 and Appendix C contain detailed information on the status and conditions of the Santa Clara and Llagas Subbasins. The GWMP demonstrates that the District has developed a thorough understanding of groundwater conditions which, in turn, supports continued sustainable management.

2) No Express Identification of Basin's Beneficial Users

SGMA requires Groundwater Sustainability Agencies like the District to consider the interests of all beneficial uses and users of groundwater. It does not require that a GSP or Alternative identify individual beneficial users or related water rights.

The GWMP contains detailed information on pumping by municipal and industrial (M&I), domestic, and agricultural users in Chapter 4. The information presented in Chapter 4 provides significant information on the county's groundwater supplies and presents a detailed water budget based on historical demand and use. Listing the nearly 5,000 individual pumping wells in Santa Clara County would not change the information on the overall demand and use in the county and, thus, is not a necessary level of detail.

Chapter 6 describes numerous programs and actions to maintain sustainable groundwater supplies for current and future beneficial uses. As stated above, the GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Instead, the District's proven groundwater management strategy, as outlined in Chapter 6, including excellent collaboration, is the preferred approach to address future challenges. Identifying specific groundwater users would do nothing to increase the effectiveness of the programs and actions described in Chapter 6, or increase an understanding of how they are implemented.

3) Failure to Include Basin's Projected Water Budget

The District ensures future water supply reliability through regular, forward-looking planning and appropriate investments. Chapter 4 and Appendix C of the GWMP present detailed water budget information for the countywide water budget, the long-term average groundwater budget, the 2015 groundwater budget, and annual change in groundwater storage. Chapter 4 includes future groundwater demand projections through 2040 from the District's Urban Water Management Plan.

The Urban Water Management Plan includes detailed information on water supply and demand projections, water supply challenges and constraints, and water supply reliability. The GWMP also discusses District planning efforts to evaluate and recommend actions for future water supply reliability through the Water Supply Master Plan. Projected groundwater demands are within historic use patterns for the Santa

Clara Subbasin and the Water Supply Master Plan will be addressing projected increases in the Llagas Subbasin.

4) GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds

Alternatives do not need to conform to GSP requirements but must demonstrate functional equivalence to certain GSP Regulation articles and that they meet the intent of SGMA. The GWMP describes historical undesirable results that have been successfully addressed through District planning and investments, including long-term declines in groundwater levels and storage, land subsidence, and salt water intrusion. The GWMP also states that the groundwater subbasins are sustainable, indicating no undesirable results are occurring, and presents supporting data and information in Chapters 2, 3, and 4.

The intent of minimum thresholds is to identify when problems may be occurring so appropriate action can be taken. The outcome measures in the GWMP have been in place since 2012, and have proven to be effective in prompting action when needed to maintain sustainable conditions. In 2014, increased pumping and decreased recharge due to drought conditions caused groundwater levels in the Santa Clara Subbasin to approach the subsidence thresholds in the GWMP outcome measure. The District and SJWC took swift and collaborative action to understand the issue and reduce pumping in key areas, resulting in a direct, positive effect on groundwater levels and minimizing the risk of resumed subsidence.

The groundwater storage outcome measure, derived from the Water Shortage Contingency Plan, has also proven effective. Based on projected end of year groundwater, the Board set water use reduction targets each calendar year between 2014 and 2016. The water retailers' response was impressive, reducing overall water use by 27% in 2015 compared to 2013 and using more treated water in lieu of groundwater pumping. Coupled with District efforts to secure supplemental surface water, this response caused groundwater levels to improve even with continued drought conditions. Countywide groundwater storage is projected to be near the Normal Stage (Stage 1) of the Water Shortage Contingency Plan at the end of 2016 despite five years of drought. This is a significant accomplishment and a testament to effective metrics and collaborative response.

The SJWC comment letter also asserts that the GWMP does not meet GSP requirements for measurable objectives. Measurable objectives serve as targets to achieve the basin sustainability goal within 20 years of implementation. Since groundwater conditions are sustainable in Santa Clara County, this concept is not applicable.

5) No Identification of GWMP's Data Gaps

Unlike many basins that have little or no groundwater data, the District has conducted extensive groundwater monitoring and analysis for decades, and the Santa Clara and Llagas subbasins have been extensively studied. Groundwater monitoring and modeling efforts are described in detail in Chapter 7 of the GWMP. As noted on GWMP page 7-1:

> "For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well construction or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins."

The District's monitoring network is extensive, and there are no significant data gaps in the monitoring programs or hydrogeologic conceptual model. Ongoing assessment and adaptation of the program to meet changing needs ensures the District will continue to collect data that supports thorough assessment of groundwater conditions and related decision making.

Ability to Amend a GWMP

The SJWC comment letter states that "SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or amending an existing GWMP as of January 1, 2015" and references Water Code Section 10750.1(a). However, for the reasons set forth below, the District is confident that the 2016 GWMP can be submitted as an alternative to a GSP under Water Code Section 10733.6(b)(1) and Section 358.2(c)(1) of the GSP Emergency Regulations.

Section 10750.1(a) does not apply to the 2016 GWMP as the Plan was adopted pursuant to the authorities provided in the District Act. Water Code Section 10733.6(b)(1) allows local agencies to submit alternative plans that are developed pursuant to not only Part 2.75, but also some other law authorizing groundwater management. Here, the District Act is the authorizing law and, as such, any prescription against adopting or amending plans prepared pursuant to Part 2.75 does not apply to the 2016 GWMP.

Even if the 2016 GWMP was developed pursuant to Part 2.75, however, the prescription against adopting or amending a groundwater management plan still does not apply to a plan submitted as an alternative to a GSP. Section 10750.1(c) states:

> "This section does not apply to a plan submitted as an alternative pursuant to Section 10733.6, unless the department has not determined that the alternative satisfies the objectives of Part 2.74 (commencing with Section 10720) on or before January 31, 2020, or the department later determines that the plan does not satisfy the objectives of that part."

A fair reading of Section 10750.1(c) suggests that a groundwater management plan can be amended or adopted after January 1, 2015, as long as it is submitted as an alternative to a GSP pursuant to Section 10733.6, and DWR determines that the plan satisfies SGMA's objectives.

For the reasons outlined above, we respectfully disagree with the SJWC assertion that the GWMP is deficient and is ineligible to be submitted as an Alternative under SGMA.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

via e-mail

Mr. Doug Muirhead
doug.muirhead@stanfordalumni.org

Subject: Response to Comments on the Santa Clara Valley Water District Draft 2016 Groundwater Management Plan

Dear Mr. Muirhead:

Thank you for your comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Your comments are summarized below, along with the District response.

Medium- and High- Priority Basin Ranking

Your comment letter notes that the DWR subbasin classification as medium or high priority is not defined until the Introduction of the GWMP, although referenced in the Executive Summary. You correctly note that a higher priority does not indicate a problem such as overdraft.

The statewide DWR basin prioritization is based on criteria including population and groundwater reliance, and focuses on basins producing greater than 90% of California's groundwater. It should not be inferred that a higher ranking indicates the basin is not well managed or is experiencing overdraft or other undesirable results.

New SGMA Authorities

The GWMP acknowledges the new authorities in SGMA as potential tools that may be needed in the future to avoid undesirable results, but does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions, and is the preferred approach to address future challenges. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep interested stakeholders apprised of related committee and stakeholder meetings.

Water Rights

You requested information on what is required to maintain District water rights. The District's ongoing water supply operations account for annual water rights. The District develops detailed operations plans to maximize the use of water rights for beneficial use and avoid exceeding allocations. These plans are updated at least monthly, but may be updated several times per week during the rainy season to determine daily releases from reservoirs or other facilities.

Careful planning helps the District to maximize the beneficial use of the water to meet the District's objectives under multiple regulations and requirements, such as Division of Safety of Dams reservoir operating restrictions and California Department of Fish and Wildlife Lake and Streambed Alteration Agreements. Local creek systems are complex and the water rights accounting process includes analyzing large amounts of data to support accurate and timely reporting for each of the District's water rights, as required by the State Water Resources Control Board.

Injection Well Pilot

With regard to the San Tomas Injection Well, you asked if it was ever used and under what conditions it may be used in the future. The injection well was operated as a pilot facility from 2003 to 2005, and is not currently in operation. Operations and maintenance are more complex for the injection well compared to managed recharge through percolation ponds and creeks, and regular use of the well would likely require new permits.

Water Banking

Your comment notes that "the assumption that we could get deliveries from the Delta failed us in recent years, and the District thus considered the Reverse Flow Project."

You correctly note that during the recent, severe drought, the District considered a proposed project to convey water banked in the Semitropic Groundwater Bank back to the San Luis Reservoir, essentially reversing the flow of the California Aqueduct. This was considered as a drought response measure due to uncertainty in Delta deliveries, but was ultimately not needed. However, the work done on this project could support a similar future project if needed.

Measurements and Data

Your comment encourages the use of more measurements and fewer estimates and gives well metering as a specific example. When practicable, the District uses measured values over estimates. However, this must consider related costs and the value of additional measurements. As shown in GWMP Table 6-1 (District Well Metering Summary), while there are several thousand unmetered wells, the related volume pumped is quite small. Over 95% of the volume of groundwater pumped in the Santa Clara and Llagas subbasins is metered, providing the

District with a good understanding of groundwater pumping while balancing costs related to installing, calibrating, and reading meters.

In your comment letter, you also ask if data collection and analysis is limited by the use of data from privately-owned wells. While some of this data cannot be shared directly with the public, the raw data is analyzed by the District and supplements data collected from District wells. The use of data from privately-owned wells helps the District to understand basin conditions while minimizing monitoring costs.

Loma Fire

Your comment letter recommends addressing post-fire issues related to the Loma Fire in the GWMP section on Watershed Management. As noted on GWMP page 6-20, "the District works to protect the water quality and water supply reliability of the District's reservoirs through regular monitoring, coordination with other agencies on water quality issues, and through activities to protect local reservoirs from potentially contaminating activities." While the District concurs that it is important to ensure local watersheds are protected from the effects of major fires, related project-specific work is more appropriately addressed outside long-term planning documents such as the GWMP.

Thank you for your continued interest in groundwater management and in the District's 2016 GWMP. We look forward to working with you moving forward as the GWMP is implemented.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Tim Guster
Vice President and General Counsel
Great Oaks Water Company
P.O. Box 23490
San Jose, CA 95153

Subject: Response to Great Oaks Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Guster:

Thank you for the Great Oaks Water Company (Great Oaks) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). The Great Oaks comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the Great Oaks comment letter are summarized below, along with the District response.

Preparation and Timing of the Alternative Plan

The Great Oaks comment letter notes the Alternative submittal deadline of January 1, 2017, and implies inadequate review time. As District staff noted in multiple meetings of the Groundwater Subcommittee dating back to April 7, 2016, planned SGMA compliance focused on updating the District's comprehensive 2012 GWMP for submittal as an Alternative. This was also discussed at Groundwater Subcommittee meetings dated June 8th, June 24th, and October 12th and at Water Retailer Committee meetings dated March 16th and July 20th.

In meetings with water retailers, District staff was clear that the 2016 GWMP would not include any fundamental change in groundwater management goals, strategies, programs, or outcome measures, which have proven effective in maintaining sustainable groundwater conditions. Rather, the focus would be on including updated and expanded technical information on the subbasins, restructuring the document to facilitate review, and acknowledging new SGMA authorities.

Because the state's Emergency GSP Regulations (which also address Alternatives) were not finalized until June 2016, this left relatively little time to understand related requirements and complete preparation of the Alternative. However, District staff worked to keep water retailers up to date on related progress, and to clearly map out planned differences between the 2016 GWMP as compared to the 2012 GWMP as explained above. While staff would have also

preferred to avoid holding the GWMP public hearing during a holiday week, the statutory deadline and Board meeting schedule left staff with few options.

Water Rights and Potential Pumping Regulation

The Great Oaks letter discusses concerns identified by several water retailers regarding water rights and potential District actions to regulate pumping. The letter notes that "District groundwater actions should not be taken without a full understanding of the effects of those actions on the retailers and their customers…" and that water retailers have no established authority to provide meaningful input on related District action.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results. The GWMP acknowledges there are related limitations and that a Groundwater Sustainability Agency cannot make a binding determination on water rights.

The District's statutory authority to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use dates back to 1929. The existing groundwater management framework, including well-established governance and decision-making authorities, has led to sustainable groundwater conditions. This proven framework, including excellent collaboration, is the preferred approach to address future challenges. The District concurs that related, potential actions must consider effects on water retailers and the community. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Compliance with SGMA Objectives

The Great Oaks comment letter supports and references the SJWC letter dated November 18, 2016, which asserts the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). As explained in the attached response to SJWC, the District respectfully disagrees with the assertion that the GWMP does not satisfy SGMA objectives. The GWMP demonstrates functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[1] and that it achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

The comment letter notes that the GWMP fails to include the required "Notice and Communication" section. As noted in the response to SJWC, the direct comparison to specific

[1] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2

elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components.

Ongoing public engagement during implementation of the GWMP will include Board meetings, other meeting forums, such as the water retailer committee and subcommittees, and other means of coordination as described in the GWMP. Programs identified in the GWMP are existing programs, many of which have been in place for decades. Major policy or investment decisions fall under the purview of the District Board of Directors and are discussed during publicly-noticed Board meetings. These meetings provide an opportunity for all stakeholders to provide input for Board consideration prior to Board action. The District will keep interested groundwater management stakeholders apprised of meetings or significant activities related to SGMA policy or implementation.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA. The District's commitment to engage water retailers and stakeholders in the evaluation of new SGMA authorities is documented in the GWMP and was clearly affirmed by the District Board when discussing the Draft GWMP in its November 22, 2016 meeting.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

Attachment: District Response to SJWC Letter

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Andrew Gere
President and Chief Operating Officer
San Jose Water Company
110 W. Taylor Street
San Jose, CA 95110-2131

Subject: Response to San Jose Water Company Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Gere:

Thank you for the San Jose Water Company (SJWC) comment letter dated November 18, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. Major topics outlined in the SJWC comment letter are summarized below, along with the District response.

Water Rights and Potential Pumping Regulation

The SJWC comment letter states that "the GWMP fails to acknowledge proprietary groundwater rights held by the Water Systems within the management area (including SJWC) and the need to directly involve such systems in defining responsive actions consistent with their vested rights." The letter goes on to request that the District agree to share governance with public water systems with regard to how any groundwater allocation or curtailment is implemented.

The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results while recognizing related limitations. The GWMP clearly acknowledges that property owners and pumpers have rights to use groundwater, and that local agencies are not authorized to make a binding determination of water rights. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of

[1] California Water Code §§10720.5(b) and 10726.8(b)

groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

Chapter 8 of the GWMP (Next Steps) includes Recommendation 6a to "Work with major pumpers to develop basin conditions that might trigger the need to regulate pumping, as well as implementation mechanisms to ensure related authorities can be effectively implemented should they become necessary." This analysis will consider related limitations with regard to existing water rights and land use authority.

The District was formed in 1929 to manage groundwater for the benefit of the community and those pumping groundwater for beneficial use. This includes municipal, domestic, industrial, and agricultural pumpers, as well as private water companies like SJWC. The District's existing, comprehensive groundwater management framework has been successful in adapting to changing needs, and has maintained sustainable conditions over many decades. This framework includes well-established and clearly defined governance structure and authorities under the Santa Clara Valley Water District Act (District Act), effective conjunctive water management programs, and partnerships with water retailers and others.

The GWMP documents this framework, including the many ways we collaborate with retailers, such as through Urban Water Management Plan development and shortage response. The existing groundwater management framework, including collaboration with water retailers and others, has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges.

Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Deficiencies Identified by SJWC

The comment letter claims the GWMP is deficient in five areas in comparison to the standards of a Groundwater Sustainability Plan (GSP). The District does not agree with this representation, for the reasons explained below. Importantly, a direct comparison to specific elements of the GSP standards is inappropriate. By definition, an Alternative to a GSP is not a GSP, nor is it required to contain all GSP components. Instead, it must demonstrate functional equivalence to Articles 5 and 7 of the Emergency GSP Regulations[2] and that the Alternative achieves SGMA objectives. Appendix B of the GWMP contains detailed information to document this functional equivalence.

[2] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2

1) Failure to Describe Basin Conditions in Required Detail

   There is no definitive level of detail required for Alternatives. As noted above, agencies submitting an Alternative must demonstrate functional equivalence to certain articles of the GSP Regulations. Functional equivalence is required to assure DWR, basin stakeholders, and the public that basin conditions are understood to the degree necessary to make informed decisions and take action to ensure sustainability. GWMP Chapters 2, 3, and 4 and Appendix C contain detailed information on the status and conditions of the Santa Clara and Llagas Subbasins. The GWMP demonstrates that the District has developed a thorough understanding of groundwater conditions which, in turn, supports continued sustainable management.

2) No Express Identification of Basin's Beneficial Users

   SGMA requires Groundwater Sustainability Agencies like the District to consider the interests of all beneficial uses and users of groundwater. It does not require that a GSP or Alternative identify individual beneficial users or related water rights.

   The GWMP contains detailed information on pumping by municipal and industrial (M&I), domestic, and agricultural users in Chapter 4. The information presented in Chapter 4 provides significant information on the county's groundwater supplies and presents a detailed water budget based on historical demand and use. Listing the nearly 5,000 individual pumping wells in Santa Clara County would not change the information on the overall demand and use in the county and, thus, is not a necessary level of detail.

   Chapter 6 describes numerous programs and actions to maintain sustainable groundwater supplies for current and future beneficial uses. As stated above, the GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Instead, the District's proven groundwater management strategy, as outlined in Chapter 6, including excellent collaboration, is the preferred approach to address future challenges. Identifying specific groundwater users would do nothing to increase the effectiveness of the programs and actions described in Chapter 6, or increase an understanding of how they are implemented.

3) Failure to Include Basin's Projected Water Budget

   The District ensures future water supply reliability through regular, forward-looking planning and appropriate investments. Chapter 4 and Appendix C of the GWMP present detailed water budget information for the countywide water budget, the long-term average groundwater budget, the 2015 groundwater budget, and annual change in groundwater storage. Chapter 4 includes future groundwater demand projections through 2040 from the District's Urban Water Management Plan.

   The Urban Water Management Plan includes detailed information on water supply and demand projections, water supply challenges and constraints, and water supply reliability. The GWMP also discusses District planning efforts to evaluate and recommend actions for future water supply reliability through the Water Supply Master Plan. Projected groundwater demands are within historic use patterns for the Santa

Clara Subbasin and the Water Supply Master Plan will be addressing projected increases in the Llagas Subbasin.

4) GWMP Fails to Identify All Required Undesirable Results or Establish Sufficient Minimum Thresholds

Alternatives do not need to conform to GSP requirements but must demonstrate functional equivalence to certain GSP Regulation articles and that they meet the intent of SGMA. The GWMP describes historical undesirable results that have been successfully addressed through District planning and investments, including long-term declines in groundwater levels and storage, land subsidence, and salt water intrusion. The GWMP also states that the groundwater subbasins are sustainable, indicating no undesirable results are occurring, and presents supporting data and information in Chapters 2, 3, and 4.

The intent of minimum thresholds is to identify when problems may be occurring so appropriate action can be taken. The outcome measures in the GWMP have been in place since 2012, and have proven to be effective in prompting action when needed to maintain sustainable conditions. In 2014, increased pumping and decreased recharge due to drought conditions caused groundwater levels in the Santa Clara Subbasin to approach the subsidence thresholds in the GWMP outcome measure. The District and SJWC took swift and collaborative action to understand the issue and reduce pumping in key areas, resulting in a direct, positive effect on groundwater levels and minimizing the risk of resumed subsidence.

The groundwater storage outcome measure, derived from the Water Shortage Contingency Plan, has also proven effective. Based on projected end of year groundwater, the Board set water use reduction targets each calendar year between 2014 and 2016. The water retailers' response was impressive, reducing overall water use by 27% in 2015 compared to 2013 and using more treated water in lieu of groundwater pumping. Coupled with District efforts to secure supplemental surface water, this response caused groundwater levels to improve even with continued drought conditions. Countywide groundwater storage is projected to be near the Normal Stage (Stage 1) of the Water Shortage Contingency Plan at the end of 2016 despite five years of drought. This is a significant accomplishment and a testament to effective metrics and collaborative response.

The SJWC comment letter also asserts that the GWMP does not meet GSP requirements for measurable objectives. Measurable objectives serve as targets to achieve the basin sustainability goal within 20 years of implementation. Since groundwater conditions are sustainable in Santa Clara County, this concept is not applicable.

5) No Identification of GWMP's Data Gaps

Unlike many basins that have little or no groundwater data, the District has conducted extensive groundwater monitoring and analysis for decades, and the Santa Clara and Llagas subbasins have been extensively studied. Groundwater monitoring and modeling efforts are described in detail in Chapter 7 of the GWMP. As noted on GWMP page 7-1:

> "For all monitoring, the District works to ensure the monitoring locations and data collected provide adequate information to facilitate a comprehensive understanding of groundwater conditions and support informed decision-making. This includes ongoing assessment of data gaps or redundancy, monitoring protocols, and data management, evaluation, and reporting. Specific wells or locations monitored may vary and evolve over time due to issues with well construction or access, but the overall programs provide strong and comprehensive data to assess conditions and trends within the Santa Clara and Llagas subbasins."

The District's monitoring network is extensive, and there are no significant data gaps in the monitoring programs or hydrogeologic conceptual model. Ongoing assessment and adaptation of the program to meet changing needs ensures the District will continue to collect data that supports thorough assessment of groundwater conditions and related decision making.

Ability to Amend a GWMP

The SJWC comment letter states that "SGMA prohibits local agencies in medium- and high-priority basins from adopting a new GWMP or amending an existing GWMP as of January 1, 2015" and references Water Code Section 10750.1(a). However, for the reasons set forth below, the District is confident that the 2016 GWMP can be submitted as an alternative to a GSP under Water Code Section 10733.6(b)(1) and Section 358.2(c)(1) of the GSP Emergency Regulations.

Section 10750.1(a) does not apply to the 2016 GWMP as the Plan was adopted pursuant to the authorities provided in the District Act. Water Code Section 10733.6(b)(1) allows local agencies to submit alternative plans that are developed pursuant to not only Part 2.75, but also some other law authorizing groundwater management. Here, the District Act is the authorizing law and, as such, any prescription against adopting or amending plans prepared pursuant to Part 2.75 does not apply to the 2016 GWMP.

Even if the 2016 GWMP was developed pursuant to Part 2.75, however, the prescription against adopting or amending a groundwater management plan still does not apply to a plan submitted as an alternative to a GSP. Section 10750.1(c) states:

> "This section does not apply to a plan submitted as an alternative pursuant to Section 10733.6, unless the department has not determined that the alternative satisfies the objectives of Part 2.74 (commencing with Section 10720) on or before January 31, 2020, or the department later determines that the plan does not satisfy the objectives of that part."

A fair reading of Section 10750.1(c) suggests that a groundwater management plan can be amended or adopted after January 1, 2015, as long as it is submitted as an alternative to a GSP pursuant to Section 10733.6, and DWR determines that the plan satisfies SGMA's objectives.

For the reasons outlined above, we respectfully disagree with the SJWC assertion that the GWMP is deficient and is ineligible to be submitted as an Alternative under SGMA.

The District and local water retailers have always had a collaborative relationship, and a continued, strong partnership will be needed as we implement the GWMP under the new framework of SGMA.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Ms. Katja Irvin
Sierra Club Loma Prieta Chapter
3921 East Bayshore Road, Suite 204
Palo Alto, CA 94303

Subject: Response to Sierra Club Comments on the Santa Clara Valley Water District 2016 Groundwater Management Plan

Dear Ms. Irvin:

Thank you for the Sierra Club comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. The Sierra Club comments are summarized below, along with the District response.

Comment: The GWMP does not adequately include the District's mission to provide water for the environment. With "One Water" the District is moving in the direction of integrated planning, and hopefully away from isolated plans that ignore important aspects of watershed-based planning.

The Sierra Club comment letter also provides several recommendations to modify GWMP basin sustainability goals, strategies, and outcome measures to address the protection and restoration of aquatic species in local streams. As described below, the GWMP provides information to support the District's One Water Plan, which is the primary forum to address related issues.

As the watershed steward for Santa Clara County, the District shares the Sierra Club's goal of protecting surface water flows and aquatic species within the authorities provided by the Santa Clara Valley Water District Act. The focus of the District's One Water Plan is to identify opportunities for improving water resource conditions that integrate the District's three mission components of water supply, flood protection, and stream stewardship. However, the One Water Plan does not replace the need for detailed plans related to individual mission components, such as the GWMP.

The District's One Water Plan, discussed in GWMP Section 6.3.4, addresses stream flow and habitat goals in Objectives F (Supportive Stream Flows: Stream Flows Support Natural Processes) and G (Resilient Habitats: Resilient Habitats and Resources for Native Species). In addition to the other programs and plans listed in GWMP Section 1.4.5 (Relation to Other

District Programs and Plans), the GWMP provides information that supports the District's One Water Plan.

An important goal of SGMA is to prevent the significant and unreasonable depletion of interconnected surface water due to groundwater pumping. As documented in GWMP Sections 2.2.3 and 3.2.3 related to groundwater/surface water interaction, the District is not aware of any areas where this undesirable result is occurring due to groundwater pumping. The GWMP also discusses District efforts to modify in-stream recharge operations to improve aquatic habitat protection through the Fisheries and Aquatic Habitat Collaborative Effort in Section 6.1.1.2.

Included in the GWMP is extensive discussion of District programs to augment the groundwater subbasins through managed and in-lieu recharge. As noted in the GWMP, District surface water releases for managed recharge (typically over 60,000 acre-feet per year) help maintain flows in local creeks, most of which would flow only intermittently otherwise. Existing groundwater management programs are effective in preventing the depletion of interconnected surface water due to overpumping.

The Sierra Club comment letter suggests that the District acknowledge environmental goals by modifying Strategy 4, which relates to coordinating with regulatory and land use agencies. However, the primary programs that ensure interconnected streams are not depleted due to overpumping are the managed and in-lieu recharge programs, which serve to maintain basin water levels and storage. District implementation of Strategy 1 (Manage groundwater in conjunction with surface water) includes working with environmental regulatory agencies to meet environmental needs.

Groundwater/surface water interaction is highly complex. District staff concurs with the Sierra Club's recommendation for further evaluation of groundwater/surface water interaction in the Santa Clara and Llagas subbasins, as noted in GWMP recommendation 4 (Maintain adequate monitoring programs and modeling tools), part (e) on page 8-4: "Improve understanding of surface water/groundwater interaction." This will include a more comprehensive evaluation of which stream reaches are gaining or losing, as recommended by the Sierra Club.

Specific Comments

The Sierra Club suggests that the word "stakeholders" be replaced with "water retailers" in the following statement on page ES-6: "Any significant policy or investment decisions would be developed and evaluated in consultation with local stakeholders, as the District does in current planning and budgeting processes." The District respectfully disagrees with the Sierra Club comment that only water retailers are involved in significant policy or investment decisions. All stakeholders have opportunities to provide input on policy or financial issues through publicly noticed meeting of the Board of Directors, Board Advisory Committees, and Board ad-hoc committees. Stakeholder engagement is also welcomed through various planning efforts, including the One Water Plan and upcoming Water Supply Master Plan.

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep interested stakeholders apprised of related committee and stakeholder meetings.

The District appreciates your suggestions to improve the maps in Chapter 2.

Thank you for your interest in the District's 2016 GWMP. We look forward to working with you as the GWMP is implemented.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Mr. Tom Zigterman
Director – Water Resources & Civil Infrastructure
Stanford University
327 Bonair Siding
Stanford, CA 94305-7272

Subject: Response to Stanford University Comments on the Draft 2016 Groundwater Management Plan

Dear Mr. Zigterman:

Thank you for the Stanford University (Stanford) comment letter received November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). Your comment letter, and this District response, will be included in an appendix to the GWMP. The Stanford comments are summarized below, along with the District response.

Comment #1: The GWMP needs to be more specific with respect to the process the District will use to evaluate new authorities and develop criteria for the exercise of those authorities.

The GWMP does not propose that new SGMA authorities related to pumping regulation or fee collection be implemented, as the existing groundwater management framework has led to sustainable groundwater conditions. This proven groundwater management strategy, including excellent collaboration, is the preferred approach to address future challenges. Stakeholder engagement beginning in 2017 will ensure that specific pumping regulation approaches are carefully considered and discussed at a time when basin conditions are sustainable. This will avoid rushed development during a crisis should pumping regulation ever be needed. The District intends to engage stakeholders in this evaluation as noted in the following statements on GWMP page 1-11:

> "The District plans to evaluate these new authorities in cooperation with water retailers and other stakeholders and consider what conditions might necessitate their implementation to sustainably manage groundwater into the future."

> "The District plans to work with water retailers and other interested stakeholders to identify the specific basin conditions that might trigger the need to control groundwater extraction and the most effective implementation mechanisms."

At the November 22nd public hearing, the Board emphasized an ongoing commitment to working closely with water retailers and other stakeholders on SGMA policy issues, and referred consideration of continued stakeholder engagement on related issues to the Board's Water Conservation and Demand Management Committee. Staff will keep water retailers and interested stakeholders apprised of related committee and stakeholder meetings.

Comment #2: The District's exercise of authority, including under SGMA as a groundwater sustainability agency, must comply with all applicable laws and cannot alter water rights.

For many decades, the District has managed groundwater sustainably under authorities provided by the Santa Clara Valley Water District Act (District Act) while complying with applicable laws and without altering water rights of pumpers. The GWMP does not propose implementing new SGMA authorities to allocate, curtail, or otherwise regulate pumping. Rather, it acknowledges these authorities as potential tools that may be needed in the future to avoid undesirable results, but highlights related limitations. As stated on page 1-12 (Section 1.4.2.2):

> "While these authorities are listed in SGMA, the Act also acknowledges limitations related to controlling pumping. Several related SGMA sections state that local agencies are not authorized to make a binding determination of the water rights of any person or entity.[1] Property owners and municipalities have rights to the reasonable, beneficial use of groundwater. Other pumpers have established appropriative rights, and may also claim prescriptive rights to local groundwater."

As acknowledged in the GWMP and noted by Stanford, careful consideration of water rights and land use authority will be a key focus and concern during the evaluation of SGMA authorities related to regulating pumping. Limitations on fees imposed pursuant to SGMA are also acknowledged on page 1-12 of the GWMP, and will be considered during evaluation.

The District and local water retailers have always had a collaborative relationship, and a continued strong partnership will be needed as we implement the GWMP under the new framework of SGMA. The District's commitment to engage water retailers and stakeholders in the evaluation of new SGMA authorities is documented in the GWMP and was clearly affirmed by the District Board.

We look forward to our continued partnership in ensuring local water supply reliability and maintaining sustainable groundwater supplies.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

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[1] California Water Code §§10720.5(b) and 10726.8(b)

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

December 14, 2016

Ms. Andrea Mackenzie
General Manager
Santa Clara Valley Open Space Authority
6980 Santa Teresa Blvd., Suite 100
San Jose, CA 95119

Subject: Response to the Santa Clara Valley Open Space Authority Comments on the Draft 2016 Groundwater Management Plan

Dear Ms. Mackenzie:

Thank you for the Santa Clara Valley Open Space Authority (Authority) comment letter dated November 22, 2016 on the Santa Clara Valley Water District's Draft 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (GWMP). After considering oral and written stakeholder comments during the November 22, 2016 public hearing, the Board of Directors (Board) adopted the GWMP.

On or before January 1, 2017, the GWMP will be submitted to the Department of Water Resources (DWR) as an Alternative Plan in accordance with the Sustainable Groundwater Management Act (SGMA). The Authority's comment letter, and this District response, will be included in an appendix to the GWMP. The Authority's comments are summarized below, along with the District response.

Comment #1: GWMP Section 1.4.5 (Relation to Other District Programs and Plans)

The Authority commented that the connection between the GWMP and the One Water Plan should be highlighted. In addition to the other programs and plans listed in Section 1.4.5 (Relation to Other District Programs and Plans), the GWMP provides information that supports the District's One Water Plan, which identifies opportunities for improving water resources conditions that integrate the District's three mission components of water supply, flood protection, and stream stewardship.

Comment #2: GWMP Sections 1.5.2 (Land Use Agencies), 1.5.3 (Local, State, and Federal Agencies), and 1.5.4 (Stakeholders)

The District agrees with the Authority's comment that partnerships with open space and resource conservation agencies are important in implementing the GWMP. In addition to the agencies shown on Figure 1-7, District collaboration with local open space and resource conservation agencies helps protect natural recharge and groundwater quality.

Comment #3: GWMP Section 4.1.2 (Groundwater)

The comment suggesting modification to Coyote Creek water right license language is noted and will be shared with District staff currently working with the State Water Resources Control Board to update the District's water rights licenses.

Comment #4: GWMP Section 4.3 (Conjunctive Water Management)

The Authority's comment recommends that the GWMP include language about the potential for increased natural recharge through ecological system restoration or enhancement. Through the One Water Plan, the District is evaluating potential water resource projects that integrate the District's water supply, watershed, and flood protection missions. This is also a goal of the formal Partnership Agreement between the District and the Authority. Through these efforts, the District looks forward to collaborating with the Authority on potential multi-objective projects in the Coyote Valley and elsewhere.

Comment #5: GWMP Figure 4.5 (Groundwater Budget for the Santa Clara and Llagas Subbasins, 2003-2012) and Figure 4-7 (Projected Future Groundwater Demands)

The Authority's comment letter references the 500 acre-foot per year deficit in the Coyote Valley water budget in the GWMP and notes opportunities to capture and recharge additional stormwater. The need for additional recharge in the Coyote Valley, or elsewhere in the Santa Clara and Llagas subbasins, is being evaluated as part of the District's Water Supply Master Plan. This plan will recommend investments needed to ensure continued water supply reliability and groundwater sustainability.

The District is currently partnering with the Authority on potential ecological restoration or enhancement projects in the Coyote Valley that may also have water supply benefits. In considering potential projects, water supply constraints and localized groundwater conditions must be carefully considered and analyzed, which may result in certain potential projects being infeasible. The District looks forward to our continued partnership to evaluate potential stormwater capture and reuse opportunities in the Coyote Valley. Stormwater reuse is also being evaluated on a broader scale as part of the District's Water Supply Master Plan, which is currently being developed.

Comment # 6: GWMP Section 4.5 (Future Demands)

The Authority's comment recommends that additional text be added to address uncertainty related to imported water supply and climate change and that the GWMP include strategies for increasing the operational storage capacity of the subbasins.

The District prepares regular, comprehensive plans to assess future water supplies/demands and recommend investments to ensure future water supply reliability through the Urban Water Management Plan and the Water Supply Master Plan, respectively. The Urban Water Management Plan evaluates future water supplies under normal, dry, and multiple dry years and discusses risks to water supplies, such as imported water availability and climate change. These plans lay the foundation for the District to address future water supply needs and risks to ensure continued water supply reliability. The District also actively assesses the risks of climate change through its Climate Change Framework Team.

The operational storage capacity for the Coyote Valley is estimated based on physical features of the groundwater subbasin, including area, specific yield (volume of water that can be released from an aquifer), and operational considerations that avoid adverse impacts. The District must consider both physical and operational conditions in assessing updated estimates of operational storage.

Comment #7: GWMP Section 5.1 (Sustainable Management Criteria)

The Authority recommends that the District consider enhanced stormwater recharge in the Coyote Valley as meeting multiple criteria, including optimizing reliability and minimizing land subsidence and salt water intrusion. As noted previously, the District looks forward to evaluating opportunities to implement projects that provide multiple benefits, including groundwater sustainability. However, water supply constraints and localized groundwater conditions must be carefully considered and analyzed, which may result in certain potential projects being infeasible.

Comment #8: GWMP Section 5.3 (Basin Management Strategies)

The District agrees with the Authority comment that there are other partnerships not listed that help protect natural recharge. In implementing Strategy 4, the District collaborates with resource conservation and open space agencies, such as the Santa Clara Valley Open Space Authority, to protect and enhance natural recharge.

Comment #9: GWMP Section 5.4 (Outcome Measures)

The Authority's comment recommends that the District set goals and performance measures to address basin urbanization. The District does not have land use authority and therefore cannot directly affect or limit urbanization. However, the District works with local land use agencies to support water supply reliability and water quality protection by reviewing general plans and certain land use proposals. The District is also a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program, which encourages green infrastructure and low-impact development.

Comment #10: GWMP Section 6.1.3 (Protection of Natural Recharge)

The District appreciates the Authority's support on strategies and projects to protect natural recharge.

Comment #11: GWMP Section 6.1.4.4 (Pricing Policies)

The Authority recommends the District evaluate the appropriateness of a net-metering system for incentivizing landowners to develop facilities that increase stormwater recharge, similar to the pilot project being implemented by the Pajaro Valley Water Management Authority (PVWMA). The Authority also notes it would like to partner with the District to pursue grants to explore this and other projects with multiple benefits.

Unlike many basins experiencing chronic overdraft, the District's direct and in-lieu recharge programs have been successful in achieving long-term balance. With very highly constrained

supplies, the PVWMA is working to reduce long-term groundwater overdraft through conservation, recycling, and managed recharge, the latter of which focuses on PVWMA owned and operated recharge basins. As a potential supplement, the PVWMA is initiating a pilot program to offer incentives for landowners to develop managed recharge projects. District staff have discussed this program will PVWMA staff, and will continue to stay updated on the five-year pilot project participation, challenges, and successes as it progresses.

The need for additional recharge to meet projected future water supply shortfalls in Santa Clara County will be evaluated in the Water Supply Master Plan, which will be completed in 2017. If additional recharge is needed, this plan will identify where it is needed and which related projects are most feasible and cost-effective. The District will consider recharge by private landowners as a potential project during this process and will continue to track related efforts elsewhere. The District appreciates the Authority's offer to partner on grants as opportunities arise.

Comment #12: GWMP Section 6.1.6.3 (Planning to Meet Future Needs)

Please see response under Comment #6 above.

Comment #13: GWMP Section 6.1.7 (Asset Management)

The Authority's comment recommends including natural capital as essential infrastructure assets for water supply reliability. While the District agrees that natural capital such as local watersheds and groundwater subbasins are essential and priceless assets, the GWMP Section 6.1.7 addresses physical infrastructure assets owned, managed, and/or maintained by the District.

Comment #14: GWMP Section 6.3.4 (Watershed Management)

The District appreciates the Authority's support and continued engagement in the One Water Plan. Because the One Water Plan is still being developed, it is premature to include specific One Water components in the GWMP. Because the GWMP will be updated every five years, this will be addressed in future updates as appropriate.

Thank you again for providing comments on the Draft 2016 GWMP. We look forward to our continued partnership in ensuring local water supply reliability, maintaining sustainable groundwater supplies, and being good environmental stewards.

Sincerely,

Norma J. Camacho
Interim Chief Executive Officer

A4. GWMP Outreach – Public Notices

State school bond will bring windfall to area

← GUSD, A1

public education facilities. At last count, it had about 54 percent of the vote.

Enough money might flow from Prop. 51 to build not only a planned new grade school but also a new South Valley Middle School at a new location, instead of renovating the aging facility on the city's east side, according to one school official.

"We are talking, give or take, $100 million. It's not guaranteed, but I think it's looking pretty good," said GUSD trustee Mark Good.

"We have been in line and we have approvals for a number of projects already," he said.

Good was elected to a fourth term on Nov. 8 and was the runaway favorite. It's not likely outstanding ballots will change that outcome. He garnered 1,175 more votes than incumbent James Pace, the next-highest vote getter, according to an as-yet incomplete vote count.

Good raised the idea of new middle school not only because of possible state matching funds, but also because the proposed high speed rail project as currently planned might cut right through South Valley's campus on IOOF Avenue.

The distribution formula for state bond money is dollar-for-dollar reimbursement for new construction and 40 percent for renovation projects.

Pace agreed that state funds have the potential to accelerate and expand plans for improving school facilities.

"It makes it a lot easier for us not having to worry as much about where the funding is coming from," he said Monday.

The state bond money will be added to $170 million from Measure E, the local facilities bond sale approved in June by GUSD voters.

In the meantime, if vote counts do not change or change by only a few voters, it means Paul Nadeau will have finished second, third or tied in 19 of 35 precincts in the Gilroy school district's race for three seats, even though he dropped out of the race.

As of Monday, Nadeau was 117 votes behind the third place candidate, BC Doyle, a former Navy SEAL, retired GUSD union leader and maintenance worker.

Good, an attorney and former Gilroy police sergeant, garnered 10,312 votes, or 29.40 percent, 1,175 more votes than Pace, his nearest opponent, according to county vote counts as of Nov. 14.

Pace's finish also appears unlikely to change. He pulled in 9,137 votes, or 26.05 percent of the 35,078 votes cast for individual candidates and counted as of Monday evening.

The latest counts show Doyle received 7,873 votes or 22.44 percent. Nadeau had 7,756 votes, or 22.11 percent—just 0.33 percent behind Doyle, according to the count on Monday.

The count will be updated twice daily, at 9 a.m. and 5 p.m., until all ballots are counted.

Nadeau is director of operations at the non-profit Navigator Schools, which runs public charter schools in Gilroy and Hollister.

After entering the race, he announced he was dropping out and would resign if elected because of a conflict of interest he said he found out about only after filing.

That is because the school board oversees and makes some decisions related to Navigator's local charter, Gilroy Prep.

This year, for example, the board is expected to consider a request to renew the school's charter to operate under the district's auspices.

But Nadeau pulled out of the race after the deadline for his name to come off the ballot. When that happens, the county is not required to put a note on ballot materials or to in any way notify voters.

That meant voters could still pick him, which they did by the thousands despite news reports he was no longer an active candidate and would resign if elected.

A resignation would throw the seat on the seven-member board open to an appointment by the board for a two-year term.

Brad Kava

St. Joseph's needs turkeys

St. Joseph's Family Center's Vicky Martin is hunting for turkeys. The organization feeds 1,000 people for Thanksgiving, but right now has only 90 turkeys. Martin says that when people don't hear that the organization is behind and in dire straits, they assume the coffers are full. They aren't. They need another 900 donations by Tuesday. You can drop turkeys off at St. Joseph's at 7950 Church St #A.

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

What: Public Hearing to Consider Comments on the 2016 Groundwater Management Plan

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10/2016_ET

LETTER OF INTENT

Hatch's storied run moves on to Cal

CHEETO BARRERA
Sports Editor


Cheeto Barrera

SIGN ME UP *Joining Kiara Lyle, Jarod Hatch signs his Letter of Intent to swim for Cal next year.*

Sobrato's Jared Hatch had several options when he was looking at which school to commit to swim at starting next year.

Although he comes from a Cal family, Hatch kept an open mind as he travels to places like Michigan and Arizona among other places as he narrowed his options.

But on his way back from a visit at Arizona, the decision became clear. There was only one option for him and he didn't need to give it much more thought: He was going to become a Golden Bear.

"It was nice at other schools but when I went to Cal, I automatically knew I wanted to go there," Hatch said. "I grew up wanting to go up there. ... I just felt at home. The team was very welcoming. I didn't have to change my personality at all or check myself. I just went with the flow and everything was great."

Hatch made his decision official last week during a signing ceremony in the Sobrato quad during lunch as his family came out in large numbers to celebrate his accomplishment.

Hatch thanked his friends and family for their support during the years where he's committed so much of his life to getting better in the pool. He thanked his friends for being there even though he "can't hang out 102 percent of the time."

"I was very nervous. I was like oh my God, am I going to mess this up even though I'm just signing a piece of paper," Hatch said. "It's a big step and you always second guess yourself and I'm happy it's over."

Hatch owns every swimming record at Sobrato.

He has qualified for CCS in every event (even though he can only swim in four total). And that was just this last year.

"Definitely a lot of ups and downs," Hatch said of his journey. "It's just something you have to push through and you can't let anything keep you down for long. Working hard for my coach. He's been there for me since day one."

Hatch was even invited to swim for Team Philippines in the 2016 Rio Olympics.

An honor he politely turned down to keep his status with Team USA in tact.

Despite declining this year, Philippines has extended an offer for 2020. He said depending on how things break, he might go that route or he may swim for the US.

Hatch is a dual citizen because his mother is a Filipino citizen, which is how he ended up with the offer.

He said there will be a lot going into the decision, but will is keeping his options open.


Cheeto Barrera

A LOT OF THANK YOUS *Sobrato's Kiara Lyle thanks a crowd of family and friends during a signing day ceremony as she committed to dive for Cal Poly next year.*

LETTER OF INTENT

Lyle found a good fit with Cal Poly diving

CHEETO BARRERA
Sports Editor

Kiara Lyle has not been diving that long.

She started her freshman year thanks in part to a friend who encouraged her to go out.

And as she signed her letter of intent to keep diving on the collegiate level for Cal Poly, the moment was not lost on her in the least.

"It's wild considering I just started diving four years ago," Lyle said. "I didn't think I was this good or good enough to dive at college at least. My hard work paid off."

Lyle signed her letter of intent during a lunchtime ceremony in the Sobrato quad with her family and friends looking on—and cheering on—in support.

Lyle was a gymnast for 10 years before she got into high school, which she said helped because many of the skills overlap.

"One of my best friends from gym left to go to diving and she really enjoyed it and she persuaded me to join," Lyle said. "At first I was really scared because water, that's not me."

As a result, Lyle has dove in three-straight CCS championship events and will be going for her fourth this spring.

Lyle said the choice to go to Cal Poly was easy thanks in large part to just how comfortable she felt at the campus and with the swimming and diving team.

"I went on a trip there and I really liked it. I fit in with the environment, I fit in with the team and really liked the coach," Lyle said. "I knew I belonged there."

Looking back, Lyle said she has some great memories of diving, especially some of the unique chances she's received over the years.

"I really liked going to travel meets and seeing all the high divers try to dive when they smack because it's not like club where everyone knows what they're doing," Lyle said.

Lyle has been active not just with diving, but also in school.

She was elected junior class and senior class president.

"It's been an awesome experience getting involved."

Public hearing notice

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Agency: N/A
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Almaden Resident

Friday, November 18, 2016

Public hearing notice

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10/2016_BA

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Public hearing notice

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10/2016_BA

Cambrian Resident
Friday, November 18, 2016

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The Campbell Reporter
Friday, November 18, 2016

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

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10/2016_BA

Letters

Letters

Thank you to County Fire for rescue

Kudos to County Fire Capt. Dave Mayfield and his crew. Early Sunday morning on Nov. 6 my daughter, husband and I stepped into an elevator at Kirk's Mini Storage in Campbell. We pressed the button for the second floor. Just then, the lights went out and the elevator quit.

We pressed the alarm, but no one was in the building to hear it. Fortunately, our cell phones had service in the elevator. Our 911 call was transferred to County Fire, and within a few minutes Mayfield was outside the elevator door talking to us. He took charge of the situation and determined the problem was a preplanned electricity shutoff on Dillon Avenue for construction.

He got the electricity turned back on within the hour. Another pleasant surprise was that the elevator company phone number was answered instantly and a repair person dispatched.

We would like to thank County Fire, and let Campbell residents know they have a professional crew on duty for their protection. We really appreciated their help.

Finally, one of the services County Fire provides is an annual inspection of businesses. That hour in the dark elevator with nothing but our cell phones for communication taught us many things about elevator safety. We hope some improvements can be made for the benefit of the next folks stranded somewhere as we were.

Cynthia Barry
Saratoga resident

Speak Out Policy

Lately the Speak Out section of the opinion page has been a little quiet in Campbell. But when you, the reader, voice your opinion, the page turns into a lively dialog that is specific to Campbell.

We welcome your letters and believe this is one of the most important pages in the newspaper, because this is where you can let the community know how you feel about a particular issue or topic. So don't hesitate to email or write. We look forward to hearing from many of you in the future. Email us at mwilson@bayareanewsgroup.com.

— Editor

Letters to the Editor

The Campbell Reporter welcomes letters commenting on its coverage and on topics of local interest. Please sign your letter and provide your address and daytime phone number so we can reach you in case of questions. We encourage letters to be a maximum of 250-300 words. Letters can be sent via e-mail to mwilson@bayareanewsgroup.com. Deadline is Wednesday.

The Campbell Reporter

General Manager
Marc Connolly
mconnolly@bayareanewsgroup.com

Executive Editor
Mario Dianda
mdianda@bayareanewsgroup.com; 408.200.1021

Editor Matt Wilson
mwilson@bayareanewsgroup.com; 408.200.1065

Sports Editor Dick Sparrer
dsparrer@bayareanewsgroup.com; 408.200.1050

Reporter Jasmine Leyva
jleyva@bayareanewsgroup.com; 408.200.1001

Photo Editor
Jacqueline Ramseyer
jramseyer@bayareanewsgroup.com; 408.200.1052

Account Executive
Diane Hedgecock
dhedgecock@bayareanewsgroup.com; 408.200.1003

Real Estate Account Executive
Amy Yeckel
ayeckel@bayareanewsgroup.com; 408.200.1014

Legal & Classified Advertising
classads@bayareanewsgroup.com
1-800-733-3933

Circulation Manager
Rick Raker
rraker@bayareanewsgroup.com; 650.391.1338

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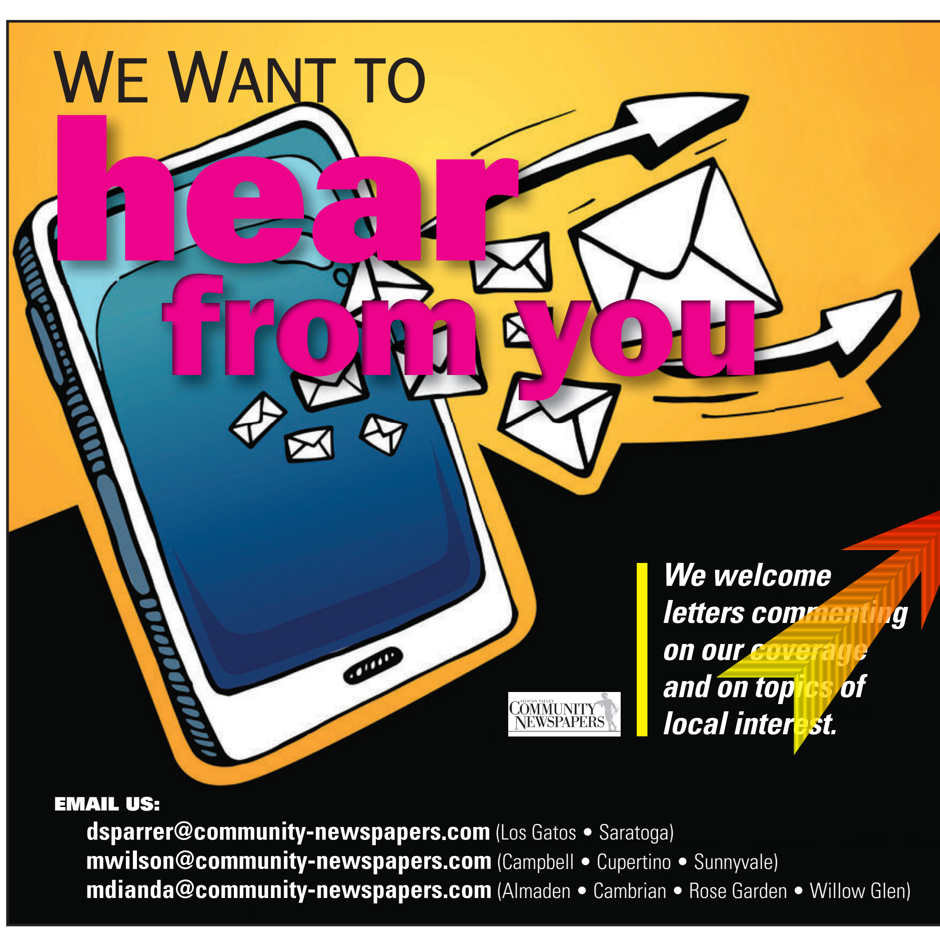
Cupertino COURIER

Friday, November 18, 2016



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10/2016_BA

Jose City Council Approves Raising Minimum Wage to $15 by 2019

if. – The San José City Council
lay November 15, 2016 to raise its
e to $15 per hour by January 1, 2019
gional effort to ensure more Silicon
s benefit from the region's growing
perity.

minimum wage will provide a
t for the thousands of hard-working
r community who are struggling
th the extraordinarily high cost of
 Valley," said Mayor Sam Liccardo.
rward together with many of our
ies, even more residents will benefit
wage and we will create a more level
 businesses throughout the region."

minated an effort launched by
o in September 2015 to forge a
ach to raising the minimum wage
licon Valley. Since then, Mayor
onvened a coalition of mayors from
con Valley, as well as representatives
ciation of Santa Clara County, to
n economic analysis studying the
tential wage increase and to develop
posal that each elected leader could
eir city councils.

minimum wage increase matches
ons from the Cities Association and
coalition of mayors to reach a $15 minimum wage by January 1, 2019 in three steps ($12 in 2017, $13.50 in 2018, and $15 in 2019), with automatic annual cost of living increases (based on the CPI, up to 5%) every year thereafter.

The City Council adopted a July 1 implementation date for the initial 2017 wage increase so that the tens-of-thousands of San Jose businesses and non-profits have time to plan for the wage hike. The council also approved a narrow exemption for seasonal job training/educational programs that target disadvantaged youth.

San José joins a number of other Santa Clara County cities who have taken steps towards a $15 minimum wage. Cupertino, Los Altos, Mountain View, Palo Alto and Sunnyvale have adopted ordinances to raise the minimum wage to $15 per hour by 2019 (Mountain View and Sunnyvale are on track to reach $15 by 2018). In addition, City Councils in Campbell, Milpitas, Santa Clara and Saratoga are expected to take up $15 minimum wage proposals in the next few months.

According to the economic analysis commissioned by the City of San José, raising the minimum wage to $15 by 2019 will generate an average pay increase of $3,000 for 115,000 San José workers (31 percent of workforce), including a ripple effect for those who earn $15-$17.50 per hour.

Notificación de Audiencia Pública

Plan Administrativo de Aguas Subterráneas del 2016

Santa Clara V
Water District

Topic: Plan Administrativo de Aguas Subterráneas del 2016

Who: Distrito de Aguas del Valle de Santa Clara (Distrito)

What: Audiencia Pública para Considerar Comentarios so
el Plan Administrativo de Aguas Subterráneas del 2

When: Martes, 22 de Noviembre, 2016, 6:00 p.m.

Where: Salón de la Directiva del Distrito
de Aguas del Valle de Santa Clara
5700 Almaden Expressway, San José, CA 95118

El Distrito ha sostenido la administración de aguas subterráne
en el Condado de Santa Clara por muchas décadas a través
de programas para proteger y aumentar el suministro de agu
De acuerdo al Acta de Administración Sostenible de Aguas
Subterráneas (SGMA), Agencias de Sostenimiento de Aguas
Subterráneas (GSAs) como la del Distrito, deben administrar
agua subterránea para evitar ciertos resultados indeseables,
deben adoptar un Plan de Sostenimiento de Aguas Subterrán
o una Alternativa prescrita.

El Distrito intenta actualizar su Plan Comprensivo de
Administración de Aguas Subterráneas y someterlo como una
Alternativa al Departamento de Recursos de Aguas de Califor
para la fecha límite del 1 de enero, 2017. El Distrito desea
incentivar la participación activa del público llevando a cabo
una audiencia pública antes de adoptar este plan.

El Plan Administrativo de Aguas Subterráneas del 2016 del
Distrito (GWMP) documenta información importante sobre las
sub-cuencas Santa Clara y Llagas, los objetivos y estrategias
de la administración de Aguas Subterráneas, programas y
actividades para sostener el agua subterránea, y medidas de
los resultados para calibrar el desempeño. El GWMP del 201
actualiza y sobrepasa todos los previos Planes de Administra
de Aguas Subterráneas del Distrito.

Para más información sobre esta audiencia y este tópico, por
favor visite nuestra página web al **http://www.valleywater.or**
groundwatermanagement o contacte a **Vanessa De La Piedra**
(408) 630-2788.

Se harán esfuerzos razonables para acomodar a personas
discapacitadas que deseen atender esta audiencia pública.
Para información adicional sobre cómo atender esta audienci
incluyendo los pedidos de acomodación por discapacidad o
asistencia de interprete, por favor contacte la **Office of the Cle**
of the Board al **(408) 630-2277** por lo menos tres días hábile
antes de la audiencia.

BRIEFS

From Page 29

members will be invited to join students on the field for a firsthand marching band and color guard experience.

Their show, titled "Déjà Vu," is an original work by composers and drill designers John Mapes and Ian Grom. Recurring musical themes and visual presentations are woven and morphed throughout the three-movement show, giving audiences a déjà vu experience. The music features trumpet solos by Michael Vronsky and baritone solos by Timothy McAfee.

The 80-member Marching Band and Color Guard has been working on its show since the second week of August. Students have spent more than 20 hours per week together rehearsing and performing. Last year, the band finished its season as one of the top eight bands in its class among Western Band Association (WBA) ensembles, which comprises bands from five western states. So far this year, the band has earned the Best Visuals caption award and placed second and third overall at regional WBA competions.

The Fall Finale is scheduled Saturday at the Los Altos High School football stadium, 201 Almond Ave. Fundraising events will begin at 10:15 a.m., followed by the show at 11 a.m. Proceeds will support all music programs at Los Altos High.

Admission is free and open to the public.

For more information, visit mvla.net/LAHS/Department/121-Performing-Arts/Portal/Instrumental-Music-Booster.

Woodside Priory play features local students

Woodside Priory School is scheduled to perform "Much Ado About Nothing" Thursday through Sunday, with a number of Los Altos students in the cast.

Set in modern-day Italy, the play follows two of playwright William Shakespeare's most beloved characters, Beatrice and Benedick, witty people who hate each other with an intense – and much expressed – loathing. Friends of the two sworn enemies conspire to make them fall head-over-heels in love. At the same time, young Claudio and Hero have fallen in love, but because of the evil Don John, all may be lost and one of them may die. Throw in a police force that couldn't find itself on a clear, sunny day with a flashlight, and the production offers a mix of slapstick, verbal wit and action.

Los Altos residents in the cast include Rachel Goines, Hannah Sheridan, Arjun Kumar and Mark Theis. Stagehands from Los Altos include Makae Wilcox, Asa Gutow, Matt Gutow and Gavin Thompson.

Performances are scheduled 7 p.m. Thursday, Friday and Saturday, and 2 p.m. Sunday in Woodside Priory's Rothrock Performance Hall, 302 Portola Road, Portola Valley.

The show is appropriate for all ages.

Tickets are $15 adults, $5 students.

Tickets may be purchased at the door or online at priory.ticketleap.com/much-ado.

Woodside Priory students are slated to perform a modern-day version of William Shakespeare's "Much Ado About Nothing." Several Los Altos students are featured in the cast.

KELLY SARGENT/SPECIAL TO THE TOWN CRIER

Ad Number: 0005851957-02
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Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic: 2016 Groundwater Management Plan

Who: Santa Clara Valley Water District (District)

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10/2016_BA

LOS GATOS WEEKLY TIMES
Friday, November 18, 2016

Park

Continued from Page 1

four competing design groups and make a decision, and two proposals — CMG's and that of !melk Fr-ee — came out as the top picks. The jury reconvened this month to hash it out and the competitors were notified of the recommendation Nov. 4.

However, a protest was received from one of the teams on Sunday, the final day it could be filed, and that may take weeks to resolve. The city isn't saying yet which group filed the protest, but you can bet it wasn't CMG.

It's another drama in the quest to reinvent one of San Jose's oldest public spaces. Once considered a downtown jewel, St. James Park has gained a reputation over the past few decades for a growing homeless population despite efforts to make it more family-friendly.

CMG's concept, titled "Remember/Imagine," includes the Park Paseo, a path through the park that connects its existing monuments such as the McKinley statue and the Robert F. Kennedy memorial forum with new spaces and amenities including a dog park, a picnic grove and a playground. A fountain in the park's center reimagines the fish sculptures that once occupied the current, dilapidated fountain — elevating them and using them to spout water onto playing kids below. It's a nifty update that takes a good cue from the popular geyser fountain at Plaza de Cesar Chavez.

A key feature in all the designs was the inclusion of an outdoor performance pavilion in the northeast corner of the park — along St. James Street — that will be jointly developed by CMG, the city, Friends of Levitt Pavilion San Jose and the Mortimer & Mimi Levitt Foundation. The Levitt Pavilion venue will host at least 50 free concerts in the park every year and will feature a huge lawn for seating — and be available for other uses like yoga or games when there's not a concert.

CMG's initial design also closes North Second Street to car traffic and proposes moving the southbound St. James VTA light-rail station south of St. John Street. Those changes and the estimated price tag on the initial design — $41 million — were probably the two biggest challenges on the plan's horizon, at least until the protest was filed.

Contact Sal Pizarro at spizarro@bayareanewsgroup.com.

COURTESY CITY OF SAN JOSE

Above is an artist's rendering of an overhead view of San Jose's St. James Park as reimagined by CMG Landscape Architecture and the firm's design partners. CMG and its partners submitted one of four proposals under consideration for the redesign.

Lawsuit

Continued from Page 1

ney Rick Doyle is recommending a settlement, which the City Council is expected to approve Tuesday.

The settlement includes a $4 million payment from Trammell Crow to the city. San Jose would use that money to acquire certain properties to the north of the SAP Center for public parking. It's unclear how many new spaces would be provided.

"The city will make good faith efforts to purchase these properties with the provided funds," Doyle wrote in a memo. "If the city is able to acquire all the properties, the city will also lease certain adjoining (Sharks Sports & Entertainment) properties for $1 /month and construct a surface parking lot that will be operated by SSE for the purposes of public parking."

Doyle confirmed Monday that the planned acquisition of nearby properties will not replace all 835 of the parking spots that would be lost.

"There will be further discussions down the road on other needs, but this is a good start," he said. "This will allow us to address the parking issue and it's something we've contemplated for a while. BART is coming down there and there's a lot of future development happening."

As part of the settlement, Sharks Sports & Entertainment will give San Jose an option to purchase the properties if the city constructs a parking garage or upon termination of its Arena Management Agreement. "The city will also make efforts to secure additional parking for SSE employee parking," Doyle wrote.

Cynthia Langhorst, a Trammell Crow spokeswoman, said final details are still being worked out, but "there is substantial agreement amongst the parties."

Bernard Vogel, III, CEO of the Silicon Valley Law Group, which represents Sharks Sports & Entertainment, declined to comment Monday.

But Sean Morley, who represents the Sharks' parent company, said the group is happy the suit is being resolved so quickly and the organization "can now return its focus to operating one of the best sports and entertainment venues in the country, which remains the single biggest economic engine in downtown."

"SSE is pleased Trammell Crow and the City are committing to improve parking opportunities close to SAP Center," Morley said in an email. He added that the settlement also ensures that the city continues to meet its obligation to provide parking within 1/3 mile of the arena.

One longtime land use consultant said the lawsuit may have strained the relationship between San Jose and the Sharks, but the proposed settlement appears to be a good deal for the parties.

"The economic benefit to Trammell Crow is probably a tenth of what it would cost them to replace those spots," said Bob Staedler, a principal at Silicon Valley Synergy, who estimates replacing 835 parking spots would cost nearly $40 million.

But, Staedler added, the Sharks for years have unsuccessfully tried to buy four private parcels near the SAP Center for parking and it's possible the city might help with that effort as part of the settlement.

"It's going to be interesting to see how involved the city will be as far as acquisition," Staedler said. "That's what it will come down to."

Contact Ramona Giwargis at 408-920-5705.

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10/2016_BA

The Mercury News
Tuesday, November 15, 2016

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10/2016_ET

MV voters display liberal streak

By Kevin Forestieri

A s the final votes from the presidential election con-
tinue to trickle in, there
clear signs that Mountain
w voters are generally more
ral and more supportive of
taxes when compared to the
of Santa Clara County, and
state as a whole.
resident-elect Donald Trump
have scored an upset victory
he electoral college, but Dem-
atic candidate Hillary Clinton
nced Trump locally, accord-
to election results from the
ta Clara County Registrar of
ers. As of Monday, Clinton
won support from 61 percent
Californians, 73.3 percent of
ta Clara County residents
80.4 percent of Mountain
w residents, making it a larger
nocratic blowout than in both
2012 and 2008 elections.
n education, more than
-thirds of Mountain View
dents supported extending
mporary sales and income
to fund public schools —
her than the rest of the
nty and the state — and a
ority of city voters favored
position 51, which would
erate $9 billion in state
ds for new school construc-
. Conversely, a majority of
ta Clara County residents
opposed the state bonds.

Efforts to repeal the death penalty in California fell short for the second time in four years, after Proposition 62 failed to reach a majority, but Mountain View residents overwhelming favored ending capital punishment. About 67.3 percent of city voters voted "Yes" on Proposition 62. In the same vein, Proposition 66 — which would speed up the lengthy decades-long death row process — was largely rejected by Mountain View voters despite winning over a slim majority of state voters.

Mountain View voters also rejected changes to the plastic bag ban under Proposition 65, which was put forward by the plastic bag industry, with only 46.1 percent of city voters supporting the measure, and instead strongly favored Proposition 67 — which upholds existing plastic bag bans — with a solid 72 percent of voters.

City residents supported the cigarette tax proposed under Proposition 56, regulations on ammunition sales under Proposition 63 and marijuana legalization under Proposition 64. A very slim majority of Mountain View voters turned down Proposition 61, which would limit prescription drug prices purchased by state agencies by tying it to the amount paid by the U.S. Department of Veterans Affairs. ▫

How Mountain View voted

		California	Santa Clara County	Mountain View
President	Hillary Clinton Donald Trump	61% 33.1%	73.3% 21.3%	80.4% 13.7%
Proposition 51	$9B in school bonds	53.9%	46.3%	53.8%
Proposition 52	Medi-Cal hospital fees	69.6%	71.7%	74.5%
Proposition 53	Vote for projects over $2 billion	48.5%	46.3%	36.1%
Proposition 54	72-hour public display of bills	64.4%	66.7%	65.5%
Proposition 55	Education tax extension	62.1%	66.25%	67.9%
Proposition 56	Cigarette tax	63.1%	73%	77.7%
Proposition 58	Multilingual education	72.5%	74.8%	77.9%
Proposition 59	Oppose Citizens United	52.5%	61.4%	67.8%
Proposition 60	Condoms in adult films	46%	44.3%	35.2%
Proposition 61	State-bought prescription drug prices	46.2%	50.1%	49.6%
Proposition 62	Repeal death penalty	46.1%	54.1%	67.3%
Proposition 63	Ammunition regulations	62.7%	74.3%	78.8%
Proposition 64	Marijuana legalization	56.1%	57.8%	67.7%
Proposition 65	Changes to plastic bag ban	44.7%	51.1%	46.1%
Proposition 66	Streamline death penalty process	50.9%	47.6%	36.5%
Proposition 67	Uphold plastic bag ban	52.1%	65.4%	72%

Source: Santa Clara County Elections Office and California Secretary of State

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10/2016_EF

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10/2016_ET

BUTTERNUT HUMMUS DEVILED EGGS

The deviled eggs from Erin Gleeson's latest cookbook "The Forest Feast Gatherings: Simple Vegetarian Menus for Hosting Friends & Family."

This recipe was adapted by Gleeson from the butternut hummus and hummus-tomato deviled eggs recipes.

- Peel and halve 12 hard-boiled eggs, then remove and set aside yolks.
- Mash yolks in a bowl with 2 tablespoons of the butternut hummus (or substitute regular hummus), 2 tablespoons mayonnaise and 2 tablespoons mustard (can be prepared one day ahead).
- Spoon mixture into egg white halves.
- Garnish each with a grape-tomato half, plus a sprinkle of paprika and salt. (Gleeson replaced the grape tomato with a few pomegranate seeds for her twist on this recipe).

Erin Gleeson

(continued from previous page)

Gleeson, who for the first time will be hosting her family's Thanksgiving meal this year, said that it is a tradition for her family to cook together all day. One of her cousins often makes deviled eggs and Manhattan cocktails for the cooks.

In that spirit, she walked the Weekly through a combination of two of her recipes in her latest cookbook: deviled eggs with butternut hummus, topped with pomegranate seeds. The appetizer is ideal for snacking during upcoming holiday gatherings and — importantly — requires a minimum of that precious oven time. The butternut gives the hummus an even creamier texture and a nutty flavor while the pomegranate seeds complement the egg and hummus with a bit of crunch and tart sweetness — and a festive flair.

Gleeson has thought through every aspect of gatherings, from prep time to the way that dishes work together to create a warm and inviting tablescape, and includes stress-free ideas for how to put together last-minute decorations for the table by using colorful produce and foraged items.

The idea stems from a Gleeson family Thanksgiving tradition. Right before the evening meal at sunset, everyone ventures outside, aprons on, a glass of wine and a paper bag in hand, and picks flowers or gathers bits of nature that have fallen on the ground — bark, pinecones, acorns, different types of leaves. They decorate the table, along with candles and other edibles sprinkled throughout.

"We (also) usually buy a bunch of pomegranates and persimmons — something kind of colorful — some fresh produce to mix in there and little votive candles, and that's the centerpiece every year," she said.

Gleeson has plans to explore other creative ventures for The Forest Feast, including launching an online stationery shop this month. In an interview, she reflected on what has led to The Forest Feast's success.

"I had so many other little projects that didn't take off, and I was sort of like 'what was it about this one that people were drawn to somehow?' I think it was that I was drawn to it more ... I was just doing what was fun, and that idea of remembering what's fun — I think if you can hold on to that, it can take you in a good direction," she said.

Gleeson will be signing copies of her new book on Monday, Nov. 20, at 5 p.m. at Books Inc. in Mountain View. ■

Editorial Assistant & Intern Coordinator Anna Medina can be reached at amedina@paweekly.com. She once worked as an unpaid studio assistant to Erin Gleeson.

WATCH ONLINE PaloAltoOnline.com

To watch a video of Gleeson assembling the recipe, go to paloaltoonline.com/arts.

Ad Number: 0005851957-02
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10/2016_BA

Rose Garden Resident

Friday, November 18, 2016

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SARATOGA NEWS
Friday, November 18, 2016

Delmar, Ellen Wrensch celebrate 50th anniversary with reception

By Dick Sparrer

PHOTOGRAPH COURTESY OF MARDELL GULLY

Ellen and Delmar Wrensch will celebrate their 50th wedding anniversary with a reception on Nov. 19. They were married on Nov. 25, 1966.

Joann's loss was certainly Ellen's gain. At least, that's the way Ellen and Delmar Wrensch see things.

Turns out that Del wasn't about to miss out on a date night, so when Joann stood him up, he decided to ask her roommate out for a date. Joann's roommate? Ellen Drake.

A few days later they went out to a movie, and that was the start of a beautiful relationship that has lasted more than half a century.

Ellen and Delmar will celebrate their 50th wedding anniversary on Nov. 19 at an evening reception hosted by their children, Mardell Gully and Tyson Wrensch. It's an event to commemorate a bond forged on Nov. 25, 1966, in their home state of Wisconsin.

Ellen was an only child, born on Oct. 10, 1944, in Milton, Wis., and just two months later Del was born on Dec. 21 in Waterton, Wis., the oldest of four children. Ellen grew up in Milton and Del in Waterton. Del graduated from the Wisconsin School of Electronics in Madison in September of 1966. Two months later, the couple married, and a day after the ceremony flew to California where Del was already working for Lockheed.

He took a detour from his career path when he was drafted in 1969 and sent to Vietnam in 1970 where he served as a communications combat engineer. He returned to Lockheed in 1971, where he worked until his retirement in 1999.

Ellen worked part-time in school food services for 24 years, but her priority was as a stay-at-home mother.

The Wrensches have lived in Cupertino for 33 years, and their two children are both graduates of Monta Vista High School. Tyson, 44, a senior account executive for Gartner Company in Las Vegas, graduated from Santa Clara University. Mardell, 42, a broker associate Realtor at Bennion Deville Homes in Orange County, is a graduate of Loyola Marymount University, where she played volleyball and is a member of the school's Athletic Hall of Fame. Mardell and her husband Sean have two children, Avery, 5, and Olivia, 3.

"They are simple, salt of the earth, true at heart Midwesterners; good, nice, neighborly people who are responsible, dependable, happy and loving," said their daughter Mardell.

Not so simple, though, that they don't enjoy traveling. In fact, over the years they have been to all seven continents, visiting an amazing 43 countries.

"Experiences are more important than things, and I love that about them," said Mardell. "They live life to the fullest."

Ad Number: 0005851957-02
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Gardening

Creative ways to substitute old foliage and stalks for cut flowers

Much of the color in the garden through autumn and winter is provided by foliage. Some foliage turns color as the weather gets cooler. Some had been blue, gray, gold, red, bronze or variegated all year, and just happen to get noticed more now that there is not much other color provided by flowers. There are a few flowers that bloom now or even later in winter, but not nearly as many as there were in spring and summer.

Coral bark Japanese maple and red twig dogwood display colorful defoliated stems as the weather gets cooler. The colorful berries of firethorn (pyracantha),

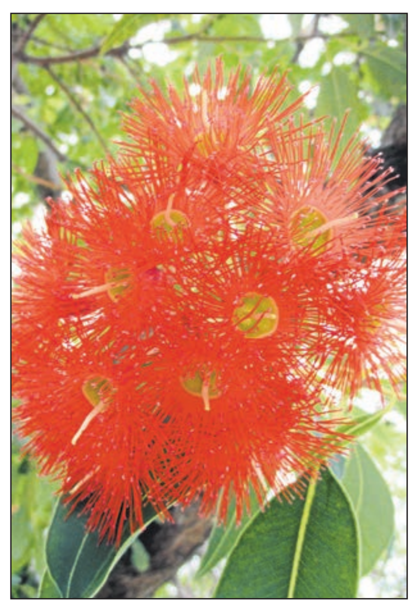
TONY TOMEO

cotoneaster and toyon will ripen about the same time, providing bright red color until the birds get them. Otherwise, there might not seem to be much more to cut and bring into the home to substitute for cut flowers and add to all the colorful foliage, twigs and berries.

Well, this is where things get less horticultural and more creative. All those old flowers and flower stalks that should get pruned off, and maybe a few old leaves, might be good for more than compost. Blooms of hydrangea, Queen Anne's lace and lavender can be cut just as they begin to deteriorate, and hung upside-down to dry. They lose much of their color, and shrivel somewhat, but are nice options to fresh flowers.

Old flower stalks of New Zealand flax and lily-of-the-Nile have striking form once plucked of tattered flower parts and seed capsules. New Zealand flax stalks are tall and straight. Lily-of-the-Nile stalks are like starbursts on sticks. If the natural color lacks appeal, they can be spray-painted. Seed capsules of red flowering gum (eucalyptus) dry in loose clusters with stems that are long enough to arrange like cut flowers.

Pine cones, magnolia grenades (seedpods) and sweetgum maces (seedpods) that fall from their stems can be drilled and attached to sticks. There are no substitutes for real flowers, but there are no limits to creative and even weird alternatives.



Because of its resiliency, drought tolerance and adaptability to the local environment, the red flowering gum makes for a good street tree. It rarely gets more than 30 feet tall and has a stout branch structure.

Tree of the Week: Red flowering gum

We all know about the bad reputation of eucalypti, especially the notorious blue gum. They are too big, too aggressive, too messy, too structurally deficient, and in groups, they are too combustible. However, there are several eucalypti that are not only appropriate for local home gardens but because of their resiliency, drought tolerance and adaptability to the local environment, should be more popular than they are.

Red flowering gum, Eucalyptus ficifolia (which is now known as Corymbia ficifolia), rarely gets more than 30 feet tall and broad, with a stout branch structure. It is a good street tree because the roots are usually deep and complaisant. Constantly falling leaves and seed capsules are somewhat messy, but the mess is proportionate to the compact canopy, and is probably worth the spectacular summer and autumn bloom.

Fuzzy trusses of staminate flowers are usually some shade of red, but might be pink, salmon, reddish orange or pale white. Trees must be a few years old to bloom, so color might be a surprise when young trees bloom for the first time. Profusion of bloom can be variable from year to year, or from one portion of the canopy to another. Tree size and form are also variable. Some are vigorous while others are more compact.

Horticulturist Tony Tomeo can be contacted at 408.551.9931 or lghorticulture@aol.com.

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Sunnyvale The Sun
Friday, November 18, 2016

Thông Báo Điều Trần Công Khai

Santa Clara Valley Water District

Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Đề tài: Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Ai mời: Khu Thủy Cục Santa Clara

Việc gì: Thảo luận và đón nhận ý kiến về Kế hoạch Quản Trị Nguồn Nước Ngầm 2016

Khi nào: Thứ Ba, ngày 22/11/2016 vào lúc 6:00 giờ tối

Tại đâu: Santa Clara Valley Water District Board Room
5700 Almaden Expressway, San Jose, CA 95118

Khu Thủy Cục đã liên tục quản trị nguồn nước ngầm trong phạm vi quận hạt Santa Clara từ nhiều thập niên qua để Bảo Vệ và Gia Tăng Lượng Nước Cung Ứng. Theo luật Sustainable Groundwater Management Act (SGMA), các cơ quan quản trị bền vững nguồn nước ngầm như Khu Thủy Cục phải quản lý nguồn nước ngầm để tránh những hậu quả không mong muốn, và phải chấp nhận một kế hoạch nguồn nước ngầm bền vững hoặc một kế hoạch thay thế.

Khu Thuỷ Cục dự định cập nhật Kế hoạch toàn diện quản lý nguồn nước ngầm và đệ nạp như là một kế hoạch thay thế lên Nha Thủy Cục California theo thời hạn luật định hạn chót là ngày 1 tháng 1, năm 2017. Khu Thủy Cục mong muốn khuyến khích công chúng tham gia tích cực qua một buổi điều trần công khai trước khi thông qua kế hoạch này.

Kế hoạch quản lý nguồn nước ngầm năm 2016 (GWMP) của Khu Thủy Cục ghi nhận các dữ kiện quan trọng về các lưu vực thứ cấp Santa Clara và Llagas, mục tiêu và chiến lược quản lý nguồn nước ngầm của Khu Thủy Cục, chương trình và các hoạt động để duy trì nguồn nước ngầm, và các biện pháp đo lường và lượng định kết quả. Kế hoạch GWMP năm 2016 cập nhật và thay thế tất cả các kế hoạch quản lý nguồn nước ngầm từ trước đến nay.

Để biết thêm tin tức về buổi điều trần này hoặc đề tài này, xin vào trang mạng của chúng tôi tại **http://www.valleywater.org/groundwatermanagement** hoặc liên lạc với **Vanessa De La Piedra** tại số **(408) 630-2788.**

Mọi nỗ lực sẽ được thực hiện hầu giúp những người bị khuyết tật có thể tham dự. Để biết thêm chi tiết hầu tham dự buổi điều trần, kể cả yêu cầu giúp đỡ người khuyết tật hay giúp thông dịch, xin liên lạc **Văn Phòng Thư Ký Ban Quản Trị** ở số **(408) 630-2277** ít nhất 3 ngày làm việc trước ngày điều trần.

10/2016_ET

Ad Number: 0005851957-02
Insertion Number: N/A
Size: 3 Col x 7.5 in
Color Type:

Advertiser: Santa Clara Valley Water Dist...
Agency: N/A
Section-Page-Zone(s): A-27-All
Description:

Willow Glen Resident
Friday, November 18, 2016

Public hearing notice

2016 Groundwater Management Plan

Santa Clara Valley Water District

Topic:	2016 Groundwater Management Plan
Who:	Santa Clara Valley Water District (District)
What:	Public Hearing to Consider Comments on the 2016 Groundwater Management Plan
When:	Tuesday, November 22, 2016, 6:00 p.m.
Where:	Santa Clara Valley Water District Board Room 5700 Almaden Expressway, San Jose, CA 95118

The District has sustainably managed groundwater in Santa Clara County for many decades through programs to protect and augment water supplies. In accordance with the Sustainable Groundwater Management Act (SGMA), Groundwater Sustainability Agencies (GSAs) such as the District must manage groundwater to avoid certain undesirable results, and must adopt a Groundwater Sustainability Plan or prescribed Alternative.

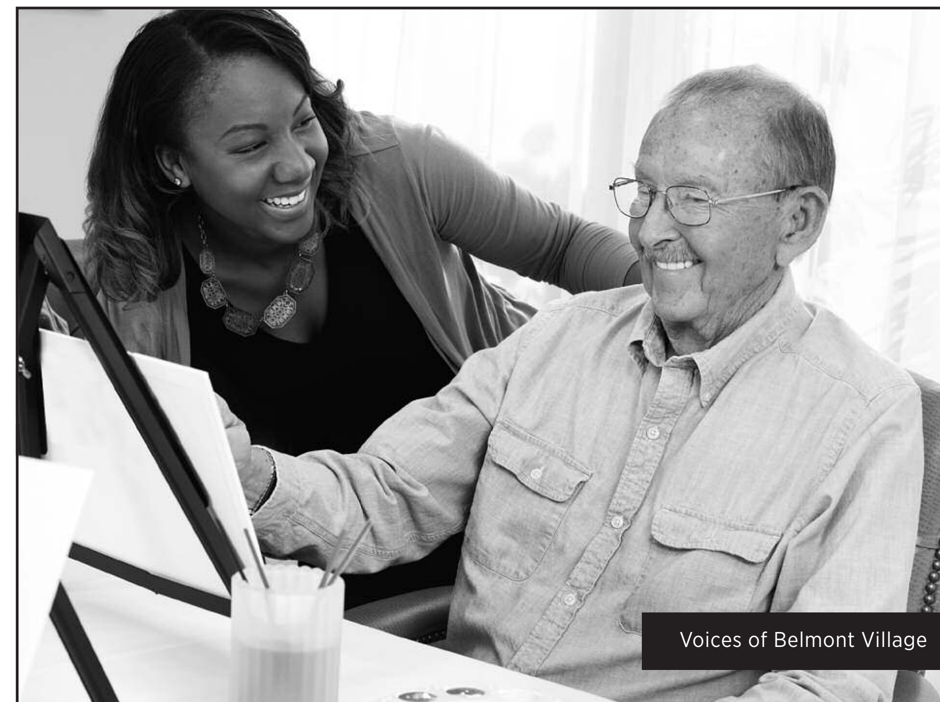
The District intends to update its comprehensive Groundwater Management Plan and submit it as an Alternative to the California Department of Water Resources by the statutory deadline of January 1, 2017. The District wishes to encourage active public involvement by holding a public hearing prior to adoption of this plan.

The District's 2016 Groundwater Management Plan (GWMP) documents important information on the Santa Clara and Llagas subbasins, District groundwater management objectives and strategies, programs and activities to sustain groundwater, and outcome measures to gauge performance. The 2016 GWMP updates and supersedes all previous District Groundwater Management Plans.

For more information about this hearing or this topic, please visit our website at **http://www.valleywater.org/groundwatermanagement** or contact **Vanessa De La Piedra** at **(408) 630-2788**.

Reasonable efforts will be made to accommodate persons with disabilities wishing to attend this public hearing. For additional information on attending this hearing, including requesting accommodations for disabilities or interpreter assistance, please contact the **Office of the Clerk of the Board** at **(408) 630-2277** at least three business days prior to the hearing.

10/2016_BA



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A5. GWMP Outreach – Letter to Interested Stakeholders

5750 Almaden Expressway, San Jose, CA 95118-3614 | (408) 265-2600 | www.valleywater.org

Santa Clara Valley Water District

July 8, 2016

Subject: Notice of Groundwater Management Plan Update

The Santa Clara Valley Water District (District) has been sustainably managing groundwater in Santa Clara County for many decades. Related groundwater management goals, programs, and desired outcomes are described in the District's comprehensive 2012 Groundwater Management Plan (GWMP).

The Sustainable Groundwater Management Act (SGMA), enacted by the State legislature in 2014, requires the District to submit a Groundwater Sustainability Plan by 2022 or an alternative plan by January 1, 2017. The District plans to update its 2012 GWMP and submit it as an alternative plan under SGMA. The District is currently reviewing and considering changes to the plan to comply with SGMA requirements and meet the January 1, 2017 deadline.

The District will hold two informational public meetings on the GWMP update:

- Thursday July 21, 2016 at 6:30 p.m.
  District Headquarters Building
  5700 Almaden Expressway, San Jose, CA 95118

- Tuesday August 2, 2016 at 6:30 p.m.
  Morgan Hill Community and Cultural Center (El Toro Room)
  17000 Monterey Road, Morgan Hill, CA 95037

The District will also make proposed revisions to the GWMP available for public review, and the District Board of Directors will hold a public hearing in November or December of 2016 to receive and consider comments on the proposed revisions.

For more information regarding SGMA, the GWMP update, meeting announcements, and availability of the draft plan, please visit www.valleywater.org/GroundwaterManagement or contact Vanessa De La Piedra, Groundwater Management Unit Manager, at (408) 630-2788 or vdelapiedra@valleywater.org.

Sincerely,

Garth C. Hall

Garth Hall
Deputy Operating Officer
Water Supply Division

cc: V. De La Piedra, B. Kassab, G. Cook, File

A6. GWMP Outreach – List of Meetings Where the GWMP was Discussed

Board of Directors Meetings

- October 13, 2015
- April 26, 2016
- November 8, 2016
- November 22, 2016

Stakeholder Meetings

- Meetings with Water Retailers Committee
  - March 16, 2016
  - July 20, 2016

- Meetings with Water Retailers Groundwater Subcommittee
  - October 22, 2015
  - April 7, 2016
  - June 8, 2016
  - June 24, 2016
  - October 12, 2016

- Informational Public Meetings
  - July 21, 2016
  - August 2, 2016

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A7. GWMP Outreach – District Website Information

Home Services Newsroom Business Jobs About Search GO

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CLEAN RELIABLE WATER
Where Does Your Water Come From?
Groundwater
Groundwater Management
Groundwater Supply
Groundwater Quality
Groundwater Monitoring
Groundwater Studies
Free Testing For Well Owners
Nitrate Treatment System Rebate Program
Imported Water
Reservoirs
Recycled Water
Water Retailers
Water Conservation
Water Charges
Drinking Water Quality
Water Supply Planning
Projects
FLOOD PROTECTION
HEALTHY CREEKS AND ECOSYSTEMS
PROGRAMS
TECHNICAL INFORMATION

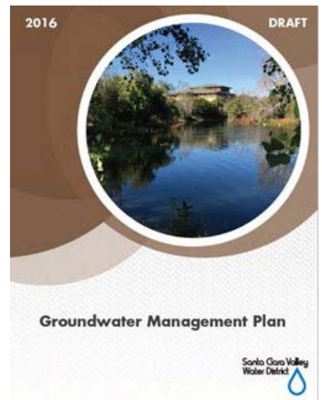
Home > Services > Clean Reliable Water > Where does your water come from > Groundwater Management

Groundwater Management

Related Information
2012 Groundwater Management Plan
Draft 2016 Groundwater Management Plan

Sustainable Groundwater Management

The Santa Clara Valley Water District has managed groundwater resources in Santa Clara County since 1929. District programs and activities protect and augment groundwater supplies to ensure long-term sustainability. The 2012 Groundwater Management Plan, adopted by the District Board of Directors in July 2012, describes the District's groundwater basin management objectives, and the strategies, programs, and activities that support those objectives.



DRAFT 2016 Groundwater Management Plan

In 2014, Governor Brown signed the Sustainable Groundwater Management Act (SGMA) to promote the local, sustainable management of groundwater supplies. For basins designated as medium and high priority by the State, SGMA requires the identification of local groundwater agencies and the development and implementation of plans to achieve sustainability. For many decades, the District has sustainably managed the Santa Clara and Llagas Subbasins, which the California Department of Water Resources (DWR) designates as medium and high priority basins, respectively.

2016 Groundwater Management Plan (GWMP)

SGMA requires preparation of a Groundwater Sustainability Plan (GSP) or Alternative for all high and medium priority basins. GSPs must be submitted by 2020 for critically overdrafted basins, and by 2022 for all others. Recognizing that groundwater is well-managed in many areas, SGMA also provides for the submittal of specified Alternatives to a GSP. Alternatives must be submitted to DWR by January 1, 2017. Emergency regulations for GSPs and Alternative Plans were adopted by the California Water Commission on May 18, 2016. Some of the requirements for GSPs are more applicable to basins working to achieve sustainability rather than those with comprehensive and sustainable programs already in place, like those in Santa Clara County.

The District's 2012 GWMP is very comprehensive, including basin management objectives, strategies, numeric outcome measures, and a description of the subbasins and groundwater management programs. The 2016 GWMP updates technical information and acknowledges additional authorities provided by SGMA, such as the ability to regulate pumping or control well spacing, which are additional tools that may be needed in the future to ensure continued sustainability. Following a public hearing on November 22, 2016, the Board of Directors will consider adoption of the 2016 GWMP Update. Upon adoption, the 2016 GWMP will be submitted to DWR as an Alternative to a GSP.

The District held two informational public meetings on the 2016 GWMP.

- Thursday July 21, 2016 at 6:30 p.m. at the District's Headquarters Building, located at 5700 Almaden Expressway, San Jose; and
- Tuesday August 2, 2016 at 6:30 p.m. at Morgan Hill Community and Cultural Center (El Toro Room), located at 17000 Monterey Road, Morgan Hill.

Comments on the draft 2016 GWMP can be submitted through e-mail at gwmp@valleywater.org or be presented at the public hearing to be held on November 22, 2016 at the District's Headquarters Building, located at 5700 Almaden Expressway, San Jose.

Decision to Become the Groundwater Sustainability Agency (GSA)

SGMA lists the District as the exclusive groundwater management agency within its statutory boundary, which includes all of Santa Clara County. Following public notice and a public hearing on May 24, 2016, the District Board of Directors adopted a resolution to become the

GSA for the Santa Clara and Llagas Subbasins, confirming the District's role as the local groundwater management agency.

This webpage was last updated on November 9, 2016. For questions, please contact us at GWMP@valleywater.org.

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A8. Environmental Documentation

Santa Clara Valley Water District

MEMORANDUM

FC 14 (01-02-07)

TO: Tiffany Hernandez, Acting Water Resources Planning Unit Manager for Debra Caldon

FROM: Ryan Heacock, Senior Environmental Planner

SUBJECT: 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins

DATE: December 20, 2016

ISSUE

Whether the district's Groundwater Management Plan meets the standard for the statutory exemption as defined under CEQA section15262.

ANALYSIS

The District Act (California Water Code Appendix, Chapter 60) provides the District with broad groundwater management authority, including the authority to protect, spread, store, retain, and cause water to percolate in the soil within Santa Clara County. On September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720. The legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.

On May 24, 2016, the District Board of Directors adopted Resolution 16-51 on the Decision to Become the Groundwater Sustainability Agency for the Santa Clara and Llagas Subbasins. The Santa Clara and Llagas Subbasins are deemed to be medium-priority and high-priority basins by the California Department of Water Resources (DWR) and therefore require the development of a Groundwater Sustainability Plan or prescribed alternative. Water Code Section 10733.6(b)(1) identifies a plan developed pursuant to Part 2.75 (commencing with Section 10750) or other law authorizing groundwater management as an acceptable alternative. The District is committed to its legislatively-created mandate to manage the surface water and groundwater resources within its jurisdiction. The 2016 Groundwater Management Plan (Plan) describes the District's comprehensive framework to ensure continued, sustainable groundwater conditions in the Santa Clara and Llagas Subbasins

The District's Plan is a planning study that sets for goals and objectives as well as possible future actions for management of the Santa Clara and Llagas Subbasins. No specific actions have been approved, adopted, or funded by the Board by adopting the Plan. Any future actions taken by the District to meet the goals and objectives of the Plan will be considered at that time and environmental review of those actions will be considered per CEQA. Planning studies such as the District's Plan are statutorily exempt per CEQA section 15262.

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CONCLUSION

Adoption of the District's Plan does not approve, adopt, or fund any specific future actions. Therefore the Plan meets the definition of a planning study under CEQA section 15262 is therefore statutorily exempt from CEQA.

Ryan Heacock, Senior Environmental Planner

Concur:

Tiffany Hernandez, Acting Water Resources Planning Unit Manager for Debra Caldon

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Appendix B – Demonstration of Functional Equivalency

The District has prepared the 2016 Groundwater Management Plan under authority granted by the District Act. The GWMP demonstrates how the District will continue to sustainably manage the Santa Clara and Llagas subbasins. The comprehensive framework documented in this plan includes authorities, sustainability goals and strategies, conjunctive management and monitoring programs, long-term planning, and numeric outcome measures that effectively prompt action when needed.

The GWMP meets the requirements of an alternative to a GSP in accordance with Water Code Section 10733.6 (b)(1) and Article 9 of the Emergency GSP Regulations.[1] Alternatives must be functionally equivalent to requirements in Articles 5 and 7 of the Emergency GSP Regulations. This plan meets the intent of SGMA and is functionally equivalent to Articles 5 and 7 of the Emergency GSP Regulations, as described in this Appendix.

General Requirements of Article 5

The functional equivalence of this GWMP to the five subarticles of Article 5 is described below.

1) Administrative Information

   The GWMP provides detailed information on the plan area as well as the District's legal authorities, governance, management structure, and funding sources. As a special act district created in 1929 to manage groundwater, the District has a well-established framework to fund and implement successful conjunctive management programs through the Water Utility Enterprise, which has a $359 million operations and capital budget for fiscal year 2016-2017.

   The GWMP also describes how the District accounts for future land use and water demand changes through the Urban Water Management Plan and Water Supply Master Plan, which have a 25-year planning horizon and are updated every five years. Beneficial uses, users, and outreach related to the 2016 GWMP are also described in various sections of the GWMP.

2) Basin Setting

   The GWMP contains detailed information on the Santa Clara and Llagas subbasins with regard to basin structure, boundaries, stratigraphy, and recharge areas. Basin conditions related to water levels, water quality, land subsidence, salt water intrusion, and interconnected surface waters are also described in detail. The GWMP also presents balanced water budgets and future groundwater demands.

3) Sustainable Management Criteria

   The District's 2012 GWMP documented numeric outcome measures to assess performance in meeting basin sustainability goals. These outcome measures, which relate to groundwater storage, land subsidence, and water quality, are largely unchanged in the 2016 GWMP as they have been effective in avoiding undesirable results and prompting action when needed. For example, the District's outcome measures for groundwater storage are related to the District's Water Shortage Contingency Plan. The recent, prolonged drought resulted in lower storage, prompting the Board to request short-term water use reduction. An impressive response by the community, coupled with water retailers' efforts to use more treated surface water in lieu of groundwater, have resulted in rebound close to the normal stage of the Water Shortage Contingency Plan. The outcome measures are evaluated annually and related reporting occurs through the District's Annual Groundwater Report.

[1] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2.

4) Monitoring Networks

The District has established extensive networks to monitor groundwater levels, groundwater quality, land subsidence, and surface water. The District evaluates data from hundreds of wells measured directly, and also leverages groundwater level and quality data collected by water retailers. Detailed information on monitoring results is available through the District's Annual Groundwater Report. The District also prepares a monthly Water Tracker, which summarizes water supply conditions, and the companion monthly Groundwater Condition Report. These reports are available on the District website, as is groundwater level data and real-time stream, reservoir, and precipitation data.

5) Projects and Management Actions

For more than 80 years, the District has implemented conjunctive water management programs to maximize water supply reliability. These programs include the direct managed recharge of about 100,000 AF of local and imported surface water each year. The District's in-lieu recharge programs, including treated surface water deliveries, water conservation, and water recycling, account for over 200,000 AF in most years. These programs require extensive infrastructure and rely on substantial local water rights and imported water agreements. The District also implements programs to ensure groundwater quality is protected, such as the well ordinance program. The GWMP contains detailed information on programs implemented by the District and other agencies to protect local groundwater.

General Requirements of Article 7

The functional equivalence of this GWMP to the Article 7 requirements is described below.

1) Annual Reports

Agencies are required to submit an annual report to DWR with information on groundwater elevations, pumping, recharge, total water use, and change in storage for the preceding water year. Each year, the District prepares a comprehensive Annual Groundwater Report with detailed information on groundwater conditions for the preceding calendar year, including all the information listed above. This report is posted to the District website and will be submitted to DWR.

2) Periodic Evaluations by the Agency

Article 7 also requires agencies to review their plans at least every five years and provide a written assessment to DWR. Article 9 (Alternatives) requires Alternatives to be submitted by January 1, 2017 and every five years thereafter. Both these requirements are aligned with the District's goal of updating the GWMP every five years. This approach supports updates to the District's Urban Water Management Plan and Water Supply Master Plan, which are also on five-year update cycles.

The table below is provided to further demonstrate functional equivalency and facilitate review of this GWMP as an Alternative.

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 1: Administrative Information		
Introduction to Administrative Information (§ 354.2)		
§ 354.2	This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.	§§ 1.2, 1.3
General Information (§ 354.4)		
§ 354.4(a)	Each Plan shall include the following general information: (a) An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	Executive Summary
§ 354.4(b)	(b) A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.	References
Agency Information (§ 354.6)		
§ 354.6(a)	When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information: The name and mailing address of the Agency.	§ 1.1
§ 354.6(b)	The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	§§ 1.1, 1.3
§ 354.6(c)	The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	§ 1.1
§ 354.6(d)	The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	§ 1.3
§ 354.6(e)	An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	§ 1.3

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Description of Plan Area (§ 354.8)		
§ 354.8(a)	Each Plan shall include a description of the geographic areas covered, including the following information: (a) One or more maps of the basin that depict the following, as applicable: (1) The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins. (2) Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative. (3) Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans. (4) Existing land use designations and the identification of water use sector and water source type. (5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	Figures 1-1, 2-1, 3-1, 4-8, 4-10
§ 354.8(b)	(b) A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	§§ 1.2, 2.1, 3.1
§ 354.8(c)	(c) Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan.	Chapters 6, 7
§ 354.8(d)	(d) A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	Chapter 6
§ 354.8(e)	(e) A description of conjunctive use programs in the basin.	§§ 4.3, 6.1

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.8(f)	(f) A plain language description of the land use elements or topic categories of applicable general plans that includes the following: (1) A summary of general plans and other land use plans governing the basin. (2) A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects. (3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon. (4) A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans. (5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	§§ 1.4, 5.3, 6.1, 6.2
§ 354.8(g)	(g) A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	§§ 1.4, 5.3, Chapter 6
Notice and Communication (§ 354.10)		
§ 354.10(a)	Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: (a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	Appendix A
§ 354.10(b)	(b) A list of public meetings at which the Plan was discussed or considered by the Agency.	Appendix A
§ 354.10(c)	(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	Appendix A
§ 354.10(d)	(d) A communication section of the Plan that includes the following: (1) An explanation of the Agency's decision-making process. (2) Identification of opportunities for public engagement and a discussion of how public input and response will be used. (3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin. (4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	§§ 1.4, 1.5, Appendix A

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 2: Basin Setting		
Introduction to Basin Setting (§ 354.12)		
§ 354.12	This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.	Chapters 2, 3
Hydrogeologic Conceptual Model (§ 354.14)		
§ 354.14(a)	(a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	Chapters 2, 3
§ 354.14(b)	(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following: (1) The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency. (2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow. (3) The definable bottom of the basin. (4) Principal aquifers and aquitards, including the following information: (A) Formation names, if defined. (B) Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information. (C) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features. (D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs. (E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply. (5) Identification of data gaps and uncertainty within the hydrogeologic conceptual Model.	Chapters 2, 3

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.14(c)	(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	Figures 2-4, 2-5, 3-4, 3-5, 3-6
§ 354.14(d)	(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following: (1) Topographic information derived from the U.S. Geological Survey or another reliable source. (2) Surficial geology derived from a qualified map including the locations of cross sections required by this Section. (3) Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies. (4) Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin. (5) Surface water bodies that are significant to the management of the basin. (6) The source and point of delivery for imported water supplies.	Figures 1-3, 2-1, 2-2, 2-4, 2-5, 2-6, 2-14, 3-1, 3-2, 3-4, 3-5, 3-6
Groundwater Conditions (§ 354.16)		
§ 354.16(a)	Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following: (a) Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including: (1) Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin. (2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	§§ 2.2, 3.2, Appendix C Figures 2-8, 2-9, 2-10, 2-11, 3-8, 3-9, 3-10
§ 354.16(b)	(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	§§ 4.4 Figures 4-9, 4-10, 4-13
§ 354.16(c)	(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	§ 2.2 Figure 2-21

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.16(d)	(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.	§§ 2.2, 3.2, 6.2 Figures 6-1, 6-2
§ 354.16(e)	(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§ 2.2 Figure 2-13
§ 354.16(f)	(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§§ 2.2, 3.2
§ 354.16(g)	(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	§§ 2.2, 3.2
Water Budget (§ 354.18)		
§ 354.18(a)	(a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	§§ 4.4, 4.5
§ 354.18(b)	(b) The water budget shall quantify the following, either through direct measurements or estimates based on data: (1) Total surface water entering and leaving a basin by water source type. (2) Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems. (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow. (4) The change in the annual volume of groundwater in storage between seasonal high conditions. (5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions. (6) The water year type associated with the annual supply, demand, and change in groundwater stored. (7) An estimate of sustainable yield for the basin.	§ 4.4

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(c) (1) and (2)	(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows: (1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information. (2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following: (A) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information. (B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon. (C) A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	§§ 4.4, 4.5

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(c)(3)	(3) Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon: (A) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise. (B) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate. (C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	§ 4.5
§ 354.18(d)	(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget: (1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use. (2) Current water budget information for temperature, water year type, evapotranspiration, and land use. (3) Projected water budget information for population, population growth, climate change, and sea level rise.	§§ 4.4, 4.5, 6.1

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.18(e)	(e) Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts tobeneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	§§ 4.4, 4.5, 7.6
§ 354.18(f)	(f) The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	§7.6
Management Areas (§ 354.20)		
§ 354.20(a)	(a) Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	Executive Summary, § 2.1
§ 354.20(b)	(b) A basin that includes one or more management areas shall describe the following in the Plan: (1) The reason for the creation of each management area. (2) The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large. (3) The level of monitoring and analysis appropriate for each management area. (4) An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	Executive Summary, § 5.4
§ 354.20(c)	(c) If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	Chapter 2

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 3: Sustainable Management Criteria		
Introduction to Sustainable Management Criteria (§ 354.22)		
§ 354.22	This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.	Chapter 5
Sustainability Goal (§ 354.24)		
§ 354.24	Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	Chapters 5, 6, 8
Undesirable Results (§ 354.26)		
§ 354.26(a)	(a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	Chapters 2, 3, 5
§ 354.26(b)	(b) The description of undesirable results shall include the following: (1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate. (2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin. (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	Chapters 2, 3, 5

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.26(c)	(c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	§ 5.4
§ 354.26(d)	(d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	Chapters 2, 3 § 5.4
Minimum Thresholds (§ 354.28)		
§ 354.28(a)	(a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	§§ 2.2, 3.2, 5.4
§ 354.28(b)	(b) The description of minimum thresholds shall include the following: (1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting. (2) The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators. (3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals. (4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests. (5) How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference. (6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	§§ 2.2, 3.2, 5.4, 7.2

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.28(c)(1)	(c) Minimum thresholds for each sustainability indicator shall be defined as follows: (1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following: (A) The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin. (B) Potential effects on other sustainability indicators.	§§ 2.2, 3.2, 5.4
§ 354.28(c)(2)	(2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	§§ 2.2, 3.2, 5.4
§ 354.28(c)(3)	(3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following: (A) Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer. (B) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	§ 2.2, 5.4
§ 354.28(c)(4)	(4) Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	§§ 2.2, 3.2, 5.4

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.28(c) (5)	(5) Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following: (A) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects. (B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	§ 2.2, 5.4
§ 354.28(c) (6)	(6) Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following: (A) The location, quantity, and timing of depletions of interconnected surface water. (B) A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	§§ 2.2, 2.3
§ 354.28(d)	(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	N/A
§ 354.28(e)	(e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	Chapters 2, 3, 5
Measurable Objectives (§ 354.30)		
§ 354.30(a)	(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	Executive Summary, Chapter 8

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.30(b)	(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	N/A
§ 354.30(c)	(c) Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	N/A
§ 354.30(d)	(d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	N/A
§ 354.30(e)	(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	Executive Summary, Chapter 8
§ 354.30(f)	(f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	N/A
§ 354.30(g)	(g) An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	N/A
Article 5. Subarticle 4: Monitoring Networks		
Introduction to Monitoring Networks (§ 354.32)		
§ 354.32	This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.	Chapter 7

Appendix B – Demonstration of Functional Equivalency

DWR Emergency Regulations Section	Requirement	GWMP Location
Monitoring Network (§ 354.34)		
§ 354.34(a)	(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	§§ 7.1, 7.2, 7.3, 7.4
§ 354.34(b)	(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following: (1) Demonstrate progress toward achieving measurable objectives described in the Plan. (2) Monitor impacts to the beneficial uses or users of groundwater. (3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds. (4) Quantify annual changes in water budget components.	§§ 7.1, 7.2, 7.3, 7.4
§ 354.34(c) (1)	(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator: (1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods: (A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer. (B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	§ 7.1
§ 354.34(c) (2)	(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	§ 7.1
§ 354.34(c) (3)	(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	§ 7.3

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.34(c)(4)	(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	§ 7.3
§ 354.34(c)(5)	(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	§ 7.2
§ 354.34(c)(6)	(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following: (A) Flow conditions including surface water discharge, surface water head, and baseflow contribution. (B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable. (C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction. (D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	§ 7.4
§ 354.34(d)	(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	Chapter 7
§ 354.34(e)	(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	Chapter 7

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.34(f)	(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors: (1) Amount of current and projected groundwater use. (2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow. (3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal. (4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	Chapter 7
§ 354.34(g)	(g) Each Plan shall describe the following information about the monitoring network: (1) Scientific rationale for the monitoring site selection process. (2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained. (3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	Chapter 7
§ 354.34(h)	(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	Chapter 7, Appendix E
§ 354.34(i)	(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	Chapter 7
§ 354.34(j)	(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	Chapters 2, 3, 5

DWR Emergency Regulations Section	Requirement	GWMP Location
Representative Monitoring (§ 354.36)		
§ 354.36(a)	Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows: (a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	Chapters 5, 7
§ 354.36(b)	(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following: (1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy. (2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	Chapters 5, 7
§ 354.36(c)	(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	Chapters 5, 7
Assessment and Improvement of Monitoring Network (§ 354.38)		
§ 354.38(a)	(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.	Chapter 7
§ 354.38(b)	(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.	N/A
§ 354.38(c)	(c) If the monitoring network contains data gaps, the Plan shall include a description of the following: (1) The location and reason for data gaps in the monitoring network. (2) Local issues and circumstances that limit or prevent monitoring. (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	N/A
§ 354.38(d)	(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	N/A

DWR Emergency Regulations Section	Requirement	GWMP Location
Article 5. Subarticle 5: Projects and Management Actions		
Introduction to Projects and Management Actions (§ 354.42)		
§ 354.42	This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.	Chapter 6
Projects and Management Actions (§ 354.44)		
§ 354.44(a)	(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	Chapters 6, 8
§ 354.44(b) (1) and (2)	(b) Each Plan shall include a description of the projects and management actions that include the following: (1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following: (A) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred. (B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken. (2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	Chapters 6, 8

DWR Emergency Regulations Section	Requirement	GWMP Location
§ 354.44(b) (3) to (8)	(3) A summary of the permitting and regulatory process required for each project and management action. (4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits. (5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated. (6) An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. (7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency. (8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	Chapter 6
§ 354.44(b) (9)	(9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	Chapters 1, 4, 6
§ 354.44(c)	(c) Projects and management actions shall be supported by best available information and best available science.	Chapters 1, 4, 6
§ 354.44(d)	(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	Chapters 1, 4, 6
Article 7 Annual Reports and Periodic Evaluations by the Agency		
§ 356.2	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan.	Chapter 7, Appendix C
§ 356.4	Each agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include components (a) through (k) as documented in the Emergency GSP Regulations.	Executive Summary, Chapter 8

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2015 Annual Groundwater Report

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Santa Clara Valley Water District

Annual Groundwater Report

For Calendar Year 2015

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Acknowledgements

PREPARED BY:

George Cook

UNDER THE DIRECTION OF:

James Fiedler
Chief Operating Officer, Water Utility Enterprise

Garth Hall
Deputy Operating Officer, Water Supply Division

Vanessa De La Piedra
Unit Manager, Groundwater Monitoring and Analysis Unit

CONTRIBUTORS:

Chanie Abuye
Henry Barrientos
Randy Behrens
Mike Duffy
Victoria Garcia
Ardy Ghoreishi
Simon Gutierrez
Bassam Kassab
Yaping Liu
Thomas Mohr
Roger Pierno
Xiaoyong Zhan

Student Interns:

Nima Mazhari
James Roman
Sophia Wendt

GRAPHICS DESIGN:
Cover and Table of Contents:

Benjamin Apolo III
Lana Gao

TABLES

FIGURES

Executive Summary

This annual Groundwater Report describes groundwater use, levels, quality, storage, and land subsidence in the Santa Clara and Llagas Subbasins for Calendar Year (CY) 2015. Groundwater monitoring data are used to evaluate outcome measures identified in the District's Groundwater Management Plan (GWMP)[1]. These measures help evaluate performance in meeting **Board Water Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."**

Groundwater provided approximately 42 percent of the water used in the county in CY 2015, the fourth year of California's ongoing drought. To help sustain and protect groundwater supplies, the District:

- Replenished groundwater with 54,900 acre-feet (AF) of local and imported surface water,
- Reduced groundwater demands by approximately 180,000 AF through treated water deliveries, water conservation, and water recycling,
- Conducted extensive monitoring of water levels, groundwater quality, and land subsidence,
- Implemented the well ordinance program and other programs to minimize threats to groundwater quality,
- Worked with basin stakeholders, land use agencies, and regulatory agencies to protect local groundwater resources, and
- Requested a 30% reduction in water use compared to 2013, which was nearly met, with an impressive 27% water use reduction in CY 2015.

Table ES-1 shows data for key indicators in CY 2015 as compared to CY 2014 and the last five years. Groundwater levels and storage were affected by ongoing extreme dry conditions, with about 26,300 AF[2] withdrawn from groundwater reserves in 2015. CY 2015 water levels slightly increased as compared to CY 2014 due to reduced pumping and increased recharge, with the exception of the Llagas Subbasin where water levels decreased because pumping did not vary much between CY 2014 and 2015. Water levels were well above historical minimums in all groundwater level index wells. Estimated end of 2015 total groundwater storage was 229,100 AF, which falls in the "Severe" stage (Stage 3) of the District's Water Shortage Contingency Plan. Groundwater quality remained very good with the exception of nitrate in South County.

North County Groundwater Summary

Groundwater use in the Santa Clara Plain was 66,300 AF, a 42% decrease from CY 2014. Pumping locations and use remained relatively stable, with nearly all groundwater used for municipal and industrial (M&I) purposes. Groundwater levels recovered slightly due to increased recharge and reduced pumping, and were above historical lows. Groundwater levels in the Santa Clara Plain were also above thresholds established to minimize the risk of land subsidence in CY 2015. Estimated groundwater storage at the end of 2015 was 214,800 AF, which was 19,800 AF lower than CY 2014.

[1] Santa Clara Valley Water District, Groundwater Management Plan, July 2012

[2] Groundwater storage estimates presented in this report are as of March 2016, and are refined as additional data becomes available.

North County groundwater is generally of very high quality. In CY 2015, 99% of water supply wells tested met all health-based drinking water standards. The only exceptions were two domestic wells in which nitrate exceeded the drinking water standard. Public water systems must comply with drinking water standards, which may require treatment or blending prior to delivery.

South County Groundwater Summary

Groundwater pumping in the Coyote Valley and Llagas Subbasin was 9,900 AF and 42,200 AF, respectively. Pumping in the South County decreased by 4% in Coyote Valley and 3% in the Llagas Subbasin compared to 2014. The distribution of pumping for M&I, domestic, and agricultural uses was similar to CY 2014. 2015 Groundwater levels were lower than 2014 levels in the Llagas Subbasin, but remained well above historical lows at index wells. Estimated groundwater storage in South County at the end of 2015 was 14,300 AF, which is 6,500 AF lower than 2014.

Groundwater quality in South County is generally good with the exception of nitrate, which remains the primary groundwater protection challenge due to historic and ongoing sources. Nitrate was detected above the drinking water standard in about 23% of South County water supply wells tested (primarily domestic wells). For this reason, the outcome measure related to drinking water standards was not met. The District continues to offer basic well testing (including nitrate) to eligible domestic well owners. As part of the Safe Clean Water Program, the District also approved five nitrate treatment system rebates for domestic well users exposed to elevated nitrate.

The occurrence of perchlorate in the Llagas Subbasin from a former highway safety flare plant has been substantially reduced due to ongoing managed recharge and removal of perchlorate from the source area. The perchlorate plume, which once extended about 10 miles from Morgan Hill to Gilroy, now extends approximately 3 miles to the San Martin Airport. The District continues to closely monitor related activities and advocate for expedited and thorough cleanup.

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Table ES-1 2015 Groundwater Conditions as Compared to Other Indices

Index[1]	2015	Compared to 2014	Compared to Last 5 Years (2010 - 2014)
Managed Recharge (AF)	54,900	Up 113%	Down 35%
Groundwater Pumping (AF)	118,500	Down 30%	Down 17%
Groundwater as % of Total Water Use	42%	Down 9%	No Change
Groundwater Levels (feet)[2]			
Santa Clara Plain	49.8	Up 20%	Down 23%
Coyote Valley	259.3	Up 1%	Down 2%
Llagas Subbasin	188.9	Down 2%	Down 14%
End of Year Groundwater Storage (AF)	229,100	Down 10%	--
Land Subsidence (feet/year)[3]	0.005	Decrease	--
Groundwater Quality[4]			
Santa Clara Plain – Median TDS, mg/L	400	No Change[5]	No Change
Coyote Valley – Median TDS, mg/L	380	No Change	No Change
Llagas Subbasin – Median TDS, mg/L	371	No Change	No Change
Santa Clara Plain –Median Nitrate, mg/L	13	No Change	Decrease
Coyote Valley – Median Nitrate, mg/L	23.8	No Change	No Change
Llagas Subbasin – Median Nitrate, mg/L	28.6	No Change	No Change

1. Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin.
2. Groundwater elevations represent the average of all readings at groundwater level -index wells for the time period noted.
3. The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2015.
4. Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3. Data from shallow monitoring wells is excluded, including wells with high TDS due to saline intrusion.
5. Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. "No change" indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either "Increase" or "Decrease" indicates a statistically significant change for the time period indicated.

Outcome measures related to groundwater storage, land subsidence, and water quality were met, with the exception of groundwater storage, nitrate, and chloride. Table ES-2 summarizes outcome measure performance and recommended actions to address measures not being met.

Groundwater Outlook

Groundwater levels and storage have begun to recover with improved rainfall and increased surface water available for managed recharge in CY 2015. Groundwater storage has been critical in helping to meet the county's water supply needs during the ongoing drought. The estimated end of year storage for 2015 was below the 300,000 AF target but water levels did not exceed subsidence thresholds in related index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 30% water use reduction target (compared to 2013) in March 2015. The water use reduction target was adjusted to 20% in June 2016 due to improved water supply conditions.

2015 Annual Groundwater Report

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several Indirect Potable Reuse (IPR) projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

Compliance with the Sustainable Groundwater Management Act (SGMA) will be a major focus of District groundwater management in CY 2016. The District was deemed the exclusive Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins on June 22, 2016 by the California Department of Water Resources (DWR). The District's scientific basin boundary modification request for the Llagas Subbasin was recently approved by DWR and will be included in a revised DWR Bulletin 118 in late 2016. The District will update the 2012 Groundwater Management Plan for submittal to DWR as an Alternative to a Groundwater Sustainability Plan under SGMA.

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Table ES-2 Summary of 2015 Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2015 Storage: 214,800 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2015 Storage: 400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2015 Storage: 13,900 AF **Action Plan for OM 2.1.1.a, b, and c:** In accordance with the Water Shortage Contingency Plan, the District Board of Directors called for a 30% countywide water use reduction in March 2015. In June 2016, this was adjusted to 20% in light of improved supplies.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2015.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 84% of countywide water supply wells tested in 2015 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 100% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives. **Action Plan for OM 2.1.1.e:** Implement Salt and Nutrient Management Plans to address salt loading, continue free testing program for domestic wells, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate and total dissolved solids as stable or decreasing concentrations were observed in 93% and 94% of wells, respectively. **Action Plan for OM 2.1.1.g:** Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met
Outcome measure not met

1. INTRODUCTION

The Santa Clara Valley Water District (District) has the responsibility and authority to manage the Santa Clara and Llagas Subbasins in Santa Clara County per an act of the California legislature[3]. The District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District Board of Directors (Board) adopted Water Supply Objective 2.1.1, which reflects the mission to protect groundwater resources: *"Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."* Pursuant to the District Act and Board policy, the District has identified the following basin management objectives in the Groundwater Management Plan (GWMP)[4]:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water intrusion.

Purpose

This annual report describes groundwater conditions in Santa Clara County for Calendar Year (CY) 2015 including groundwater use, water levels, storage, quality, and land subsidence. The following outcome measures (OM) derived from the GWMP are also assessed to evaluate performance in meeting Water Supply Objective 2.1.1:

- OM 2.1.1.a. Greater than 278,000 AF[5] of projected end of year groundwater storage in the Santa Clara Plain.
- OM 2.1.1.b. Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.
- OM 2.1.1.c. Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.
- OM 2.1.1.d. 100% of subsidence index wells with groundwater levels above subsidence thresholds.
- OM 2.1.1.e. At least 95% of countywide water supply wells meet primary drinking water standards.
- OM 2.1.1.f. At least 90% of South County wells meet Basin Plan agricultural objectives.
- OM 2.1.1.g. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

Study Area

This report presents information for the Santa Clara and Llagas Subbasins, which are managed by the District and are identified by DWR as Subbasins 2-9.02 and 3-3.01, respectively (Figure 1). The District divides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley due to land use and management characteristics. Both the Santa Clara Plain and Llagas Subbasin have confined and recharge areas. Within the confined areas, low permeability clays and silts separate shallow and principal aquifers, with the latter defined as aquifer materials greater than about 150 feet below ground surface.

[3] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.
[4] Santa Clara Valley Water District, Groundwater Management Plan, July 2012.
[5] AF = acre-feet. One acre-foot is equal to 325,900 gallons.

DWR is currently considering revisions to basin boundaries as allowed by SGMA. DWR conducted an internal review and is proposing to revise the boundaries of both the Santa Clara and Llagas Subbasins to correspond with the San Mateo, Alameda, and San Benito county lines. The District submitted a request to DWR to modify the eastern boundary of the Llagas Subbasin, which was recently approved by DWR. The eastern portion of the Llagas Subbasin as currently defined by DWR is underlain by bedrock and sediments that do not contain significant quantities of groundwater. Figure 1 illustrates the current DWR basin boundaries and the area proposed to be removed. The figures in this report will present the revised Llagas Subbasin.

The information in this report is summarized by groundwater management area or by groundwater charge zone (Figure 2). Charge Zone W-2 (North County) generally coincides with the Santa Clara Plain, while Zone W-5 generally overlaps the combined area of the Coyote Valley and Llagas Subbasin.

Report Content

In addition to this Introduction, this Annual Groundwater Report for 2015 includes the following chapters:

- Chapter 2: Groundwater Pumping, Recharge, and Water Balance
- Chapter 3: Groundwater Levels and Storage
- Chapter 4: Land Subsidence
- Chapter 5: Groundwater Quality
- Chapter 6: Other Groundwater Management Activities
- Chapter 7: Conclusions

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Figure 1 Santa Clara County Groundwater Subbasins

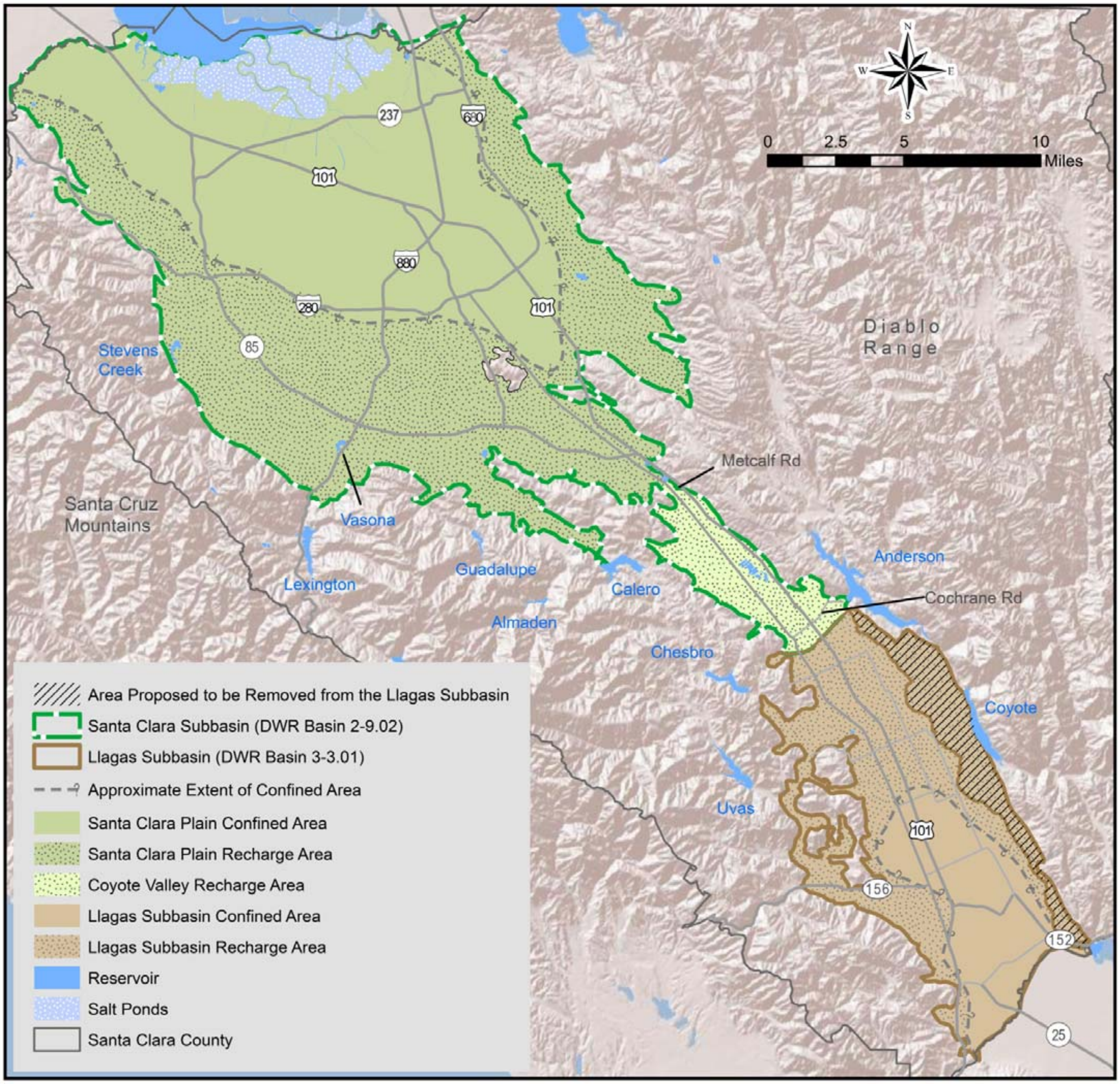
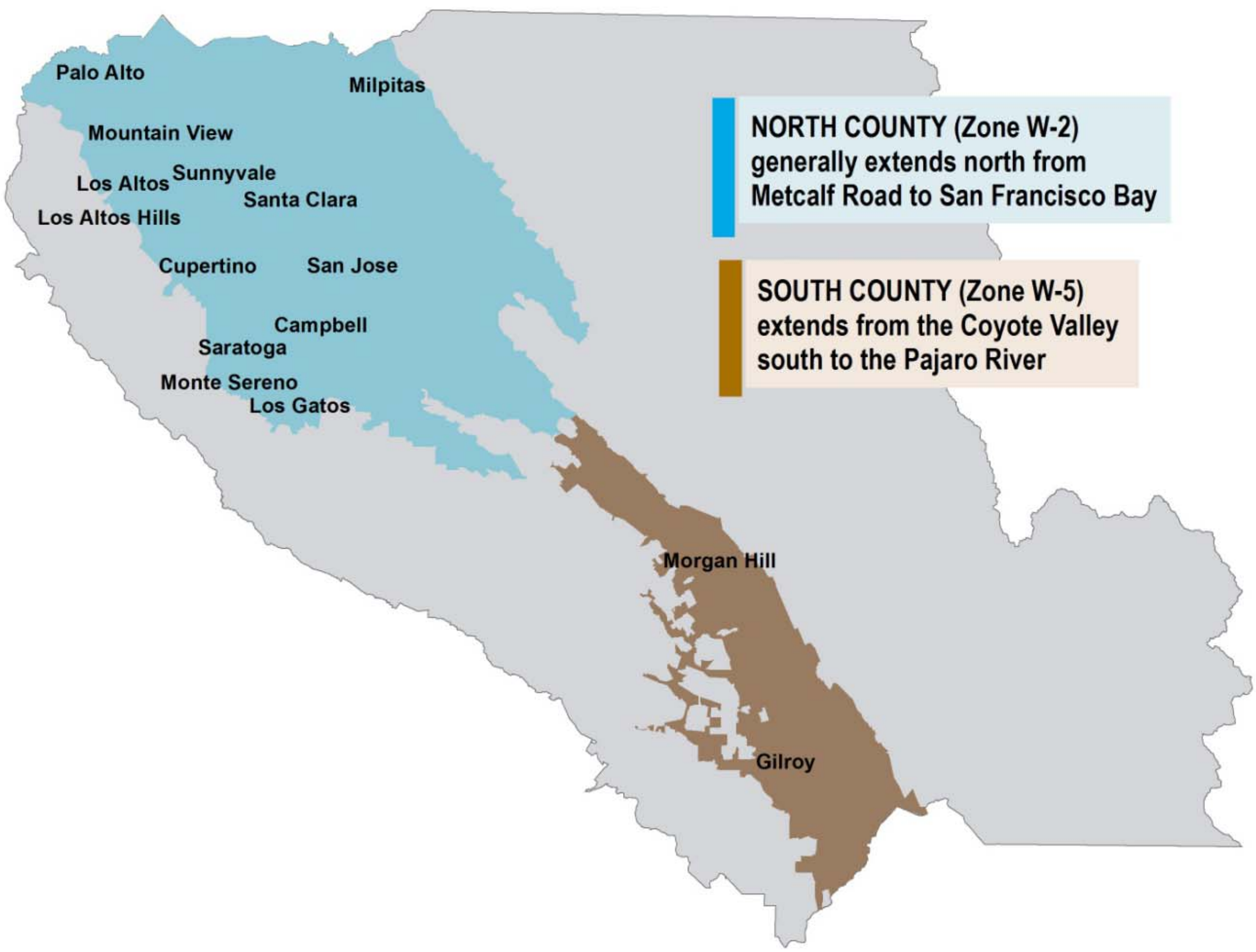


Figure 2 Groundwater Charge Zones



2. GROUNDWATER PUMPING, RECHARGE, AND WATER BALANCE

Countywide groundwater pumping in CY 2015 was 118,500 acre-feet (AF), providing about 42 percent of the water used by county residents and businesses. Compared to CY 2014, groundwater pumping decreased 42 percent in the Santa Clara Plain, 5 percent in Coyote Valley, and 3 percent in the Llagas Subbasin. Due to dry conditions and limited surface water supplies, the District operated a limited managed recharge program, using about 55,000 AF of local and imported water to replenish the groundwater subbasins. In-lieu recharge, including treated water deliveries, recycled water use, and water conservation programs reduced demands on groundwater by approximately 180,000 AF.

The primary inflow to the subbasins was managed recharge, providing over 57% of total inflow. Groundwater pumping accounted for over 96% of the subbasin outflows. Due to ongoing dry conditions, outflows exceeded inflows, resulting in a net decrease in storage of about 26,300 AF between 2014 and 2015.

2.1 Groundwater Pumping

Approximately 118,500 AF of groundwater was pumped in Santa Clara County in CY 2015, compared to 168,400 AF in CY 2014. Figures 3 and 4 show the location and volume of CY 2015 groundwater pumping, and Table 1 summarizes pumping by area and use category.

Table 1 CY 2015 Groundwater Pumping by Use (AF)

Use	Zone W-2 North County	Zone W-5 South County		Total
	Santa Clara Plain	Coyote Valley	Llagas Subbasin	
Municipal & Industrial (M&I)	65,450	6,460	16,930	88,840
Domestic	350	220	2,240	2,810
Agricultural	530	3,270	23,050	26,850
Total	**66,330**	**9,950**	**42,220**	**118,500**

Groundwater in North County is used primarily for M&I purposes, with minimal agricultural or domestic use. In South County, agricultural use is more significant. This is especially evident in the Llagas Subbasin, where more than half of the use is for agriculture. While the quantity of groundwater used for domestic purposes is relatively small in South County, there are a large number of individual wells that reported groundwater use (Table 2).

Table 2 Wells Reporting Groundwater Use in CY 2015

Use	Zone W-2 North County	Zone W-5 South County	
	Santa Clara Plain	Coyote Valley	Llagas Subbasin
Municipal & Industrial (M&I)	756	58	261
Domestic	399	336	2,716
Agricultural	42	92	577

Note: Some wells may report pumping for more than one use category (e.g., domestic and agricultural).

Figure 3 **CY 2015 Zone W2 Groundwater Pumping**

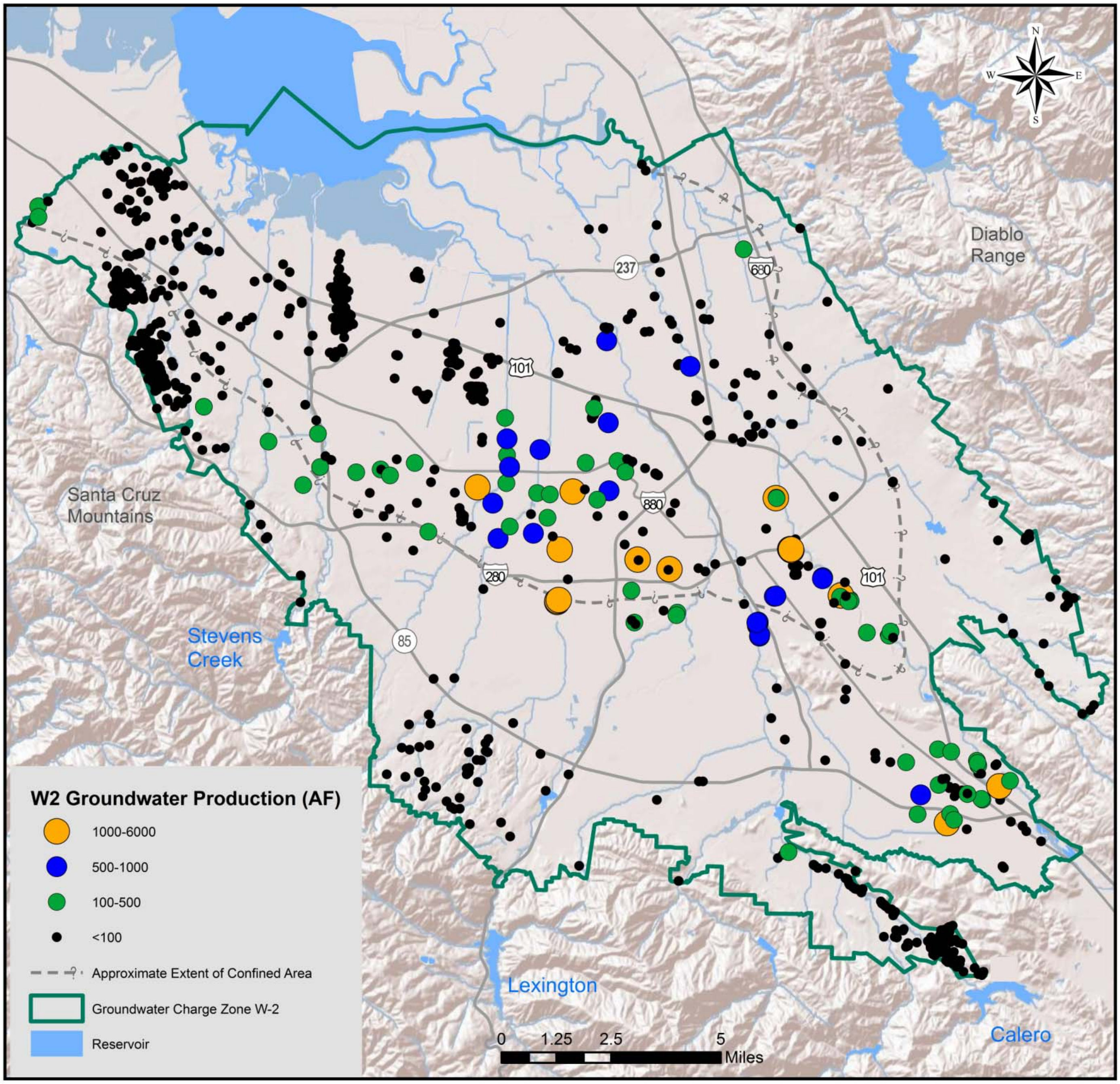
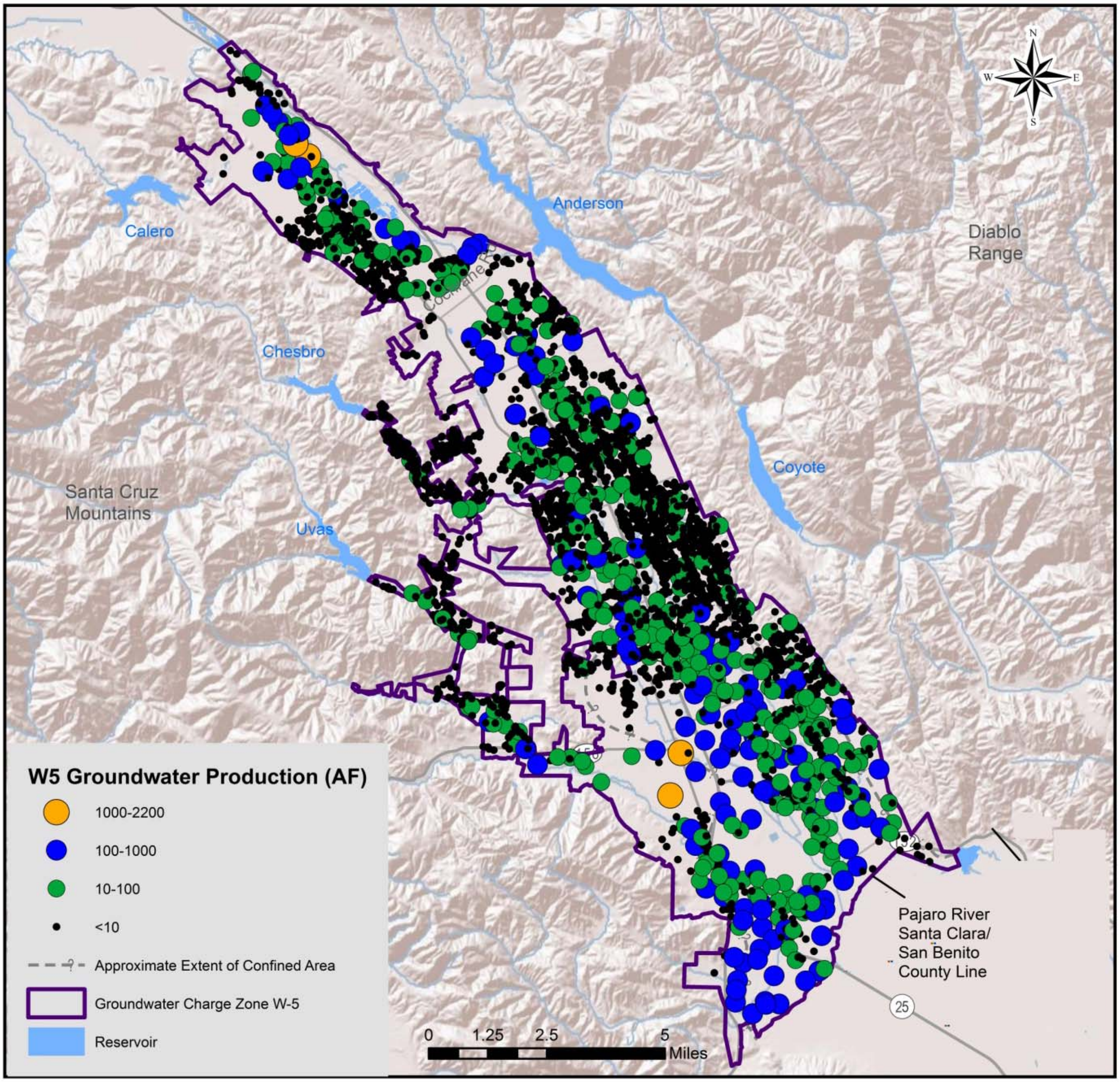


Figure 4 CY 2015 Zone W5 Groundwater Pumping



Groundwater Pumping Trends

Groundwater pumping is largely offset by the District's managed recharge of local and imported surface water in normal or wet years (Figure 5). Over the last 25 years, managed recharge has averaged 65% of the amount of groundwater pumped.

Total water use decreased in CY 2015 in all three groundwater areas due to water use reduction efforts in response to the drought. Countywide groundwater pumping was down approximately 30% from the previous year (Table 3). Groundwater use decreased 42%, 4% and 3% in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, respectively. Since groundwater is the only potable water supply for the Coyote Valley and Llagas Subbasin, the decrease in total water use is reflected in pumping. Figure 6 shows the countywide water use by source, including groundwater, treated water, SFPUC supplies, local surface water and recycled water. Groundwater provided about 42% of the total water used countywide in CY 2015.

Groundwater pumping and use patterns over time are shown in Figure 7 for each of the groundwater management areas. In the Santa Clara Plain, a significant drop in groundwater pumping is noted in the late 1980s following completion of the District's Santa Teresa Water Treatment Plant (WTP). Since then, pumping has averaged about 100,000 AF per year in the Santa Clara Plain. A notable increase in pumping in the Coyote Valley occurred in 2006 when a water retailer installed new wells and began extracting water to serve customers in the Santa Clara Plain. This increased the average annual pumping volume by about 5,000 AF. Pumping in the Llagas Subbasin has remained relatively stable over the period of record.

Major Groundwater Users

The largest groundwater users in each charge zone are shown on Figure 8. Water retailers are the primary users in North County, accounting for over 88% of all pumping. San Jose Water Company is the largest individual user, followed by other retailers and a few large industrial users. Unlike North County, about half of pumping in South County is from numerous individual pumpers including agricultural and domestic users. In South County, water retailer pumping accounts for about 33% of groundwater use. Other large users include golf courses and industrial users.

Table 3 CY 2015 Groundwater Pumping Compared to Other Indices (AF)

Groundwater Subbasin/Area	2015	2014	5 Year Average (2010-2014)	Period of Record (Average)
Santa Clara Subbasin, Santa Clara Plain	66,300	114,500	88,400	114,900
Santa Clara Subbasin, Coyote Valley	10,000	10,400	11,700	8,700
Llagas Subbasin	42,200	43,500	42,800	42,700
Total	**118,500**	**168,400**	**142,900**	**166,300**

Note: The period of record is 1981-2015 for the Santa Clara Plain and 1988-2015 for Coyote Valley and Llagas Subbasin.

Figure 5 Countywide Groundwater Pumping and Managed Recharge

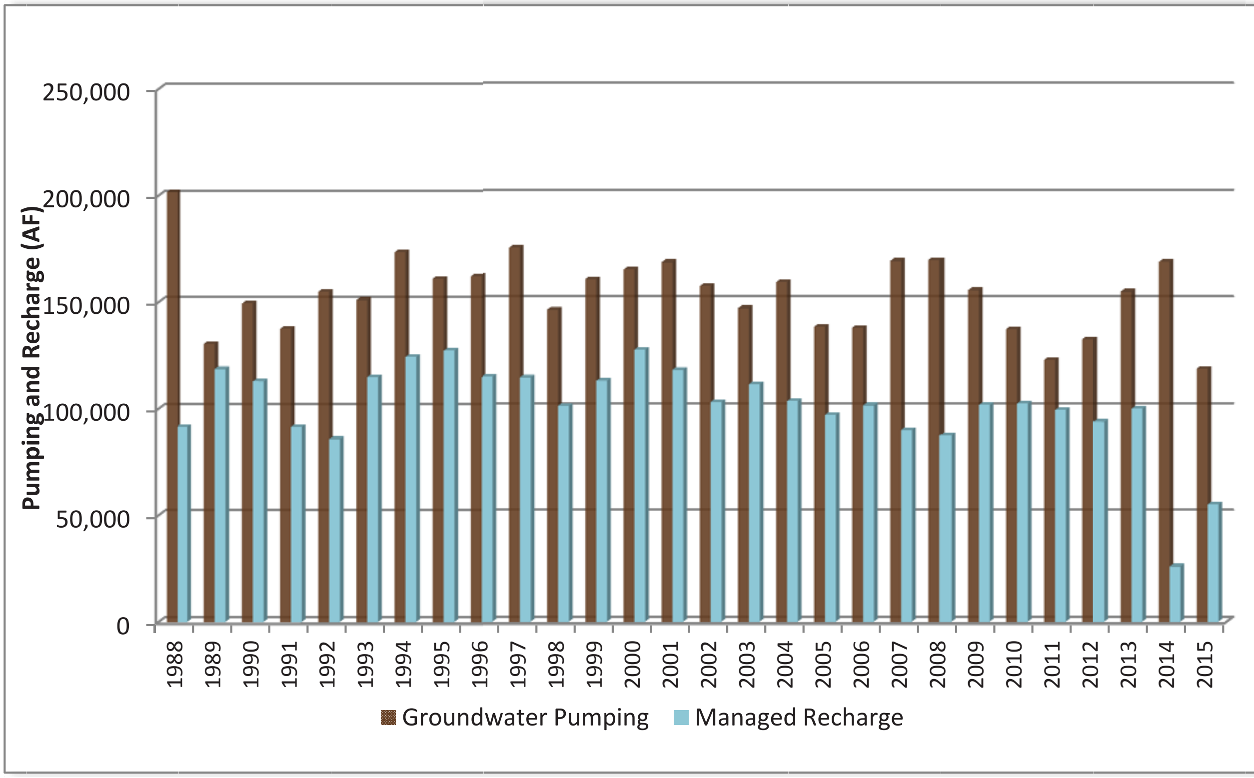


Figure 6 Countywide Water Use

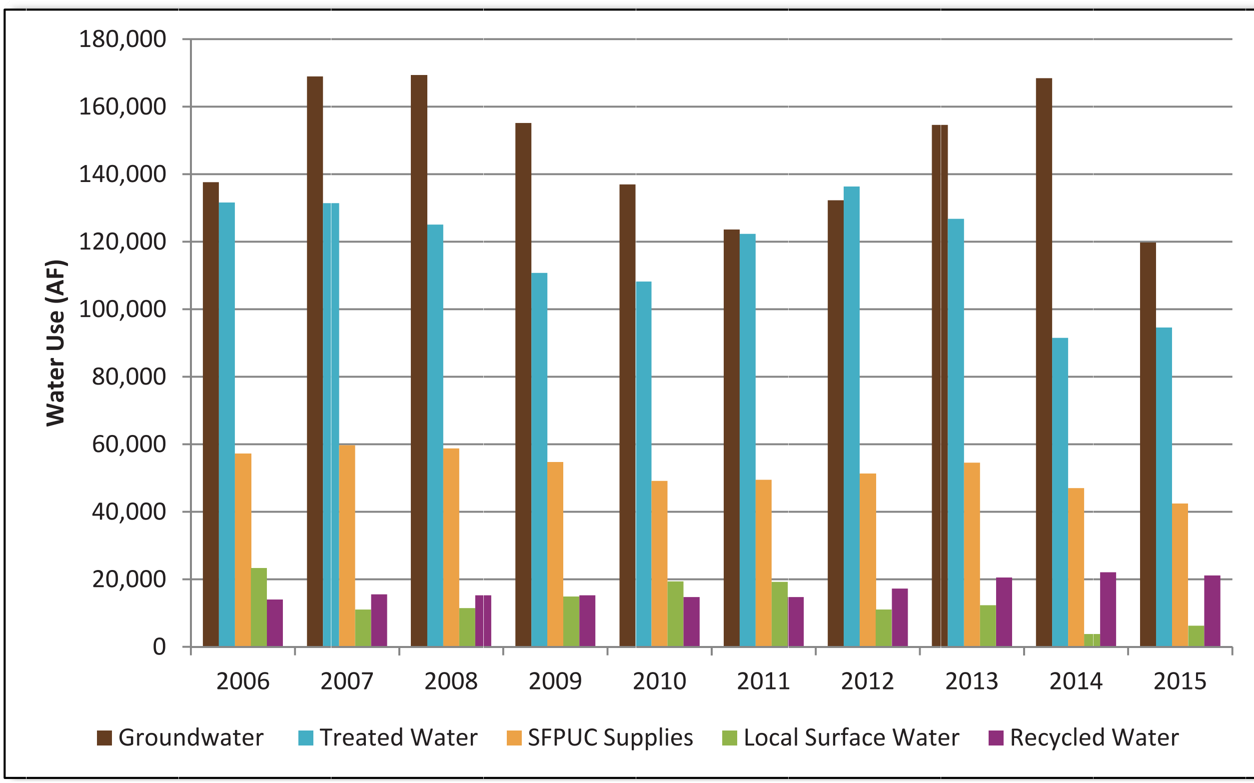
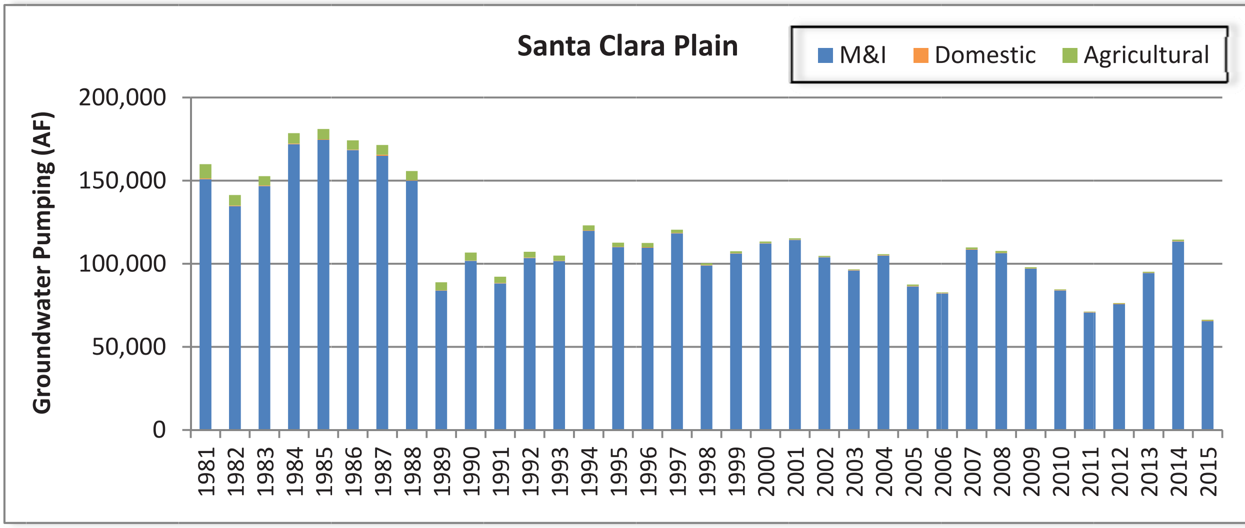
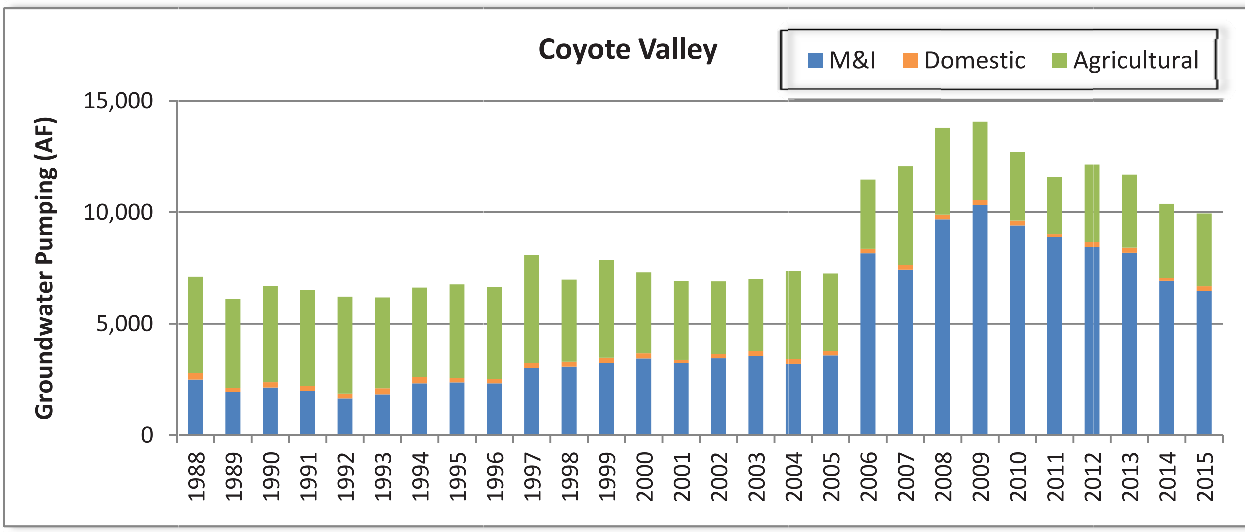


Figure 7 **Groundwater Pumping by Use Category**





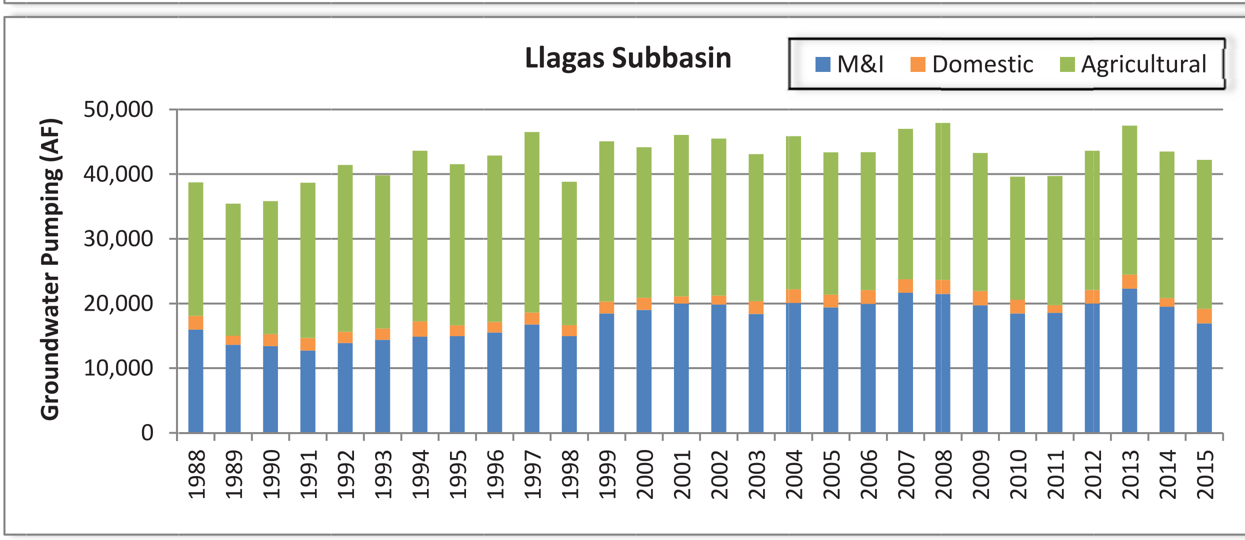
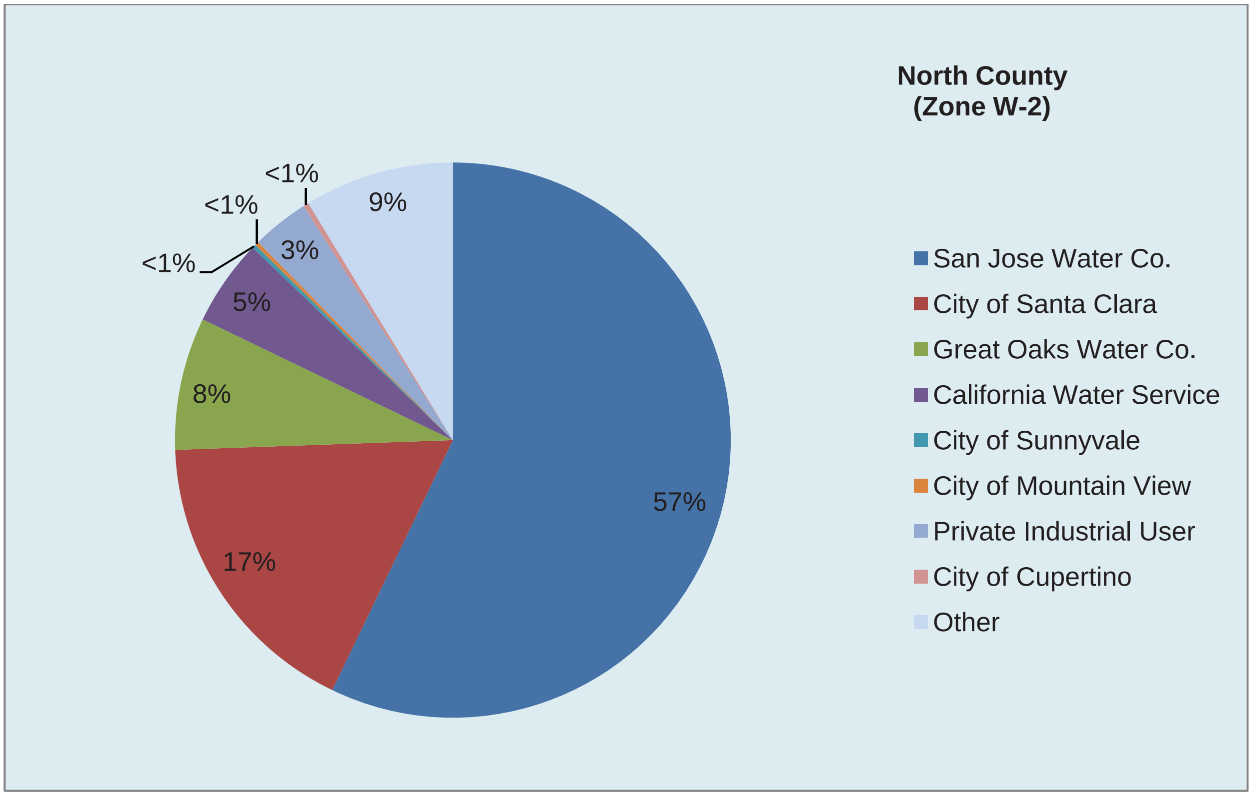
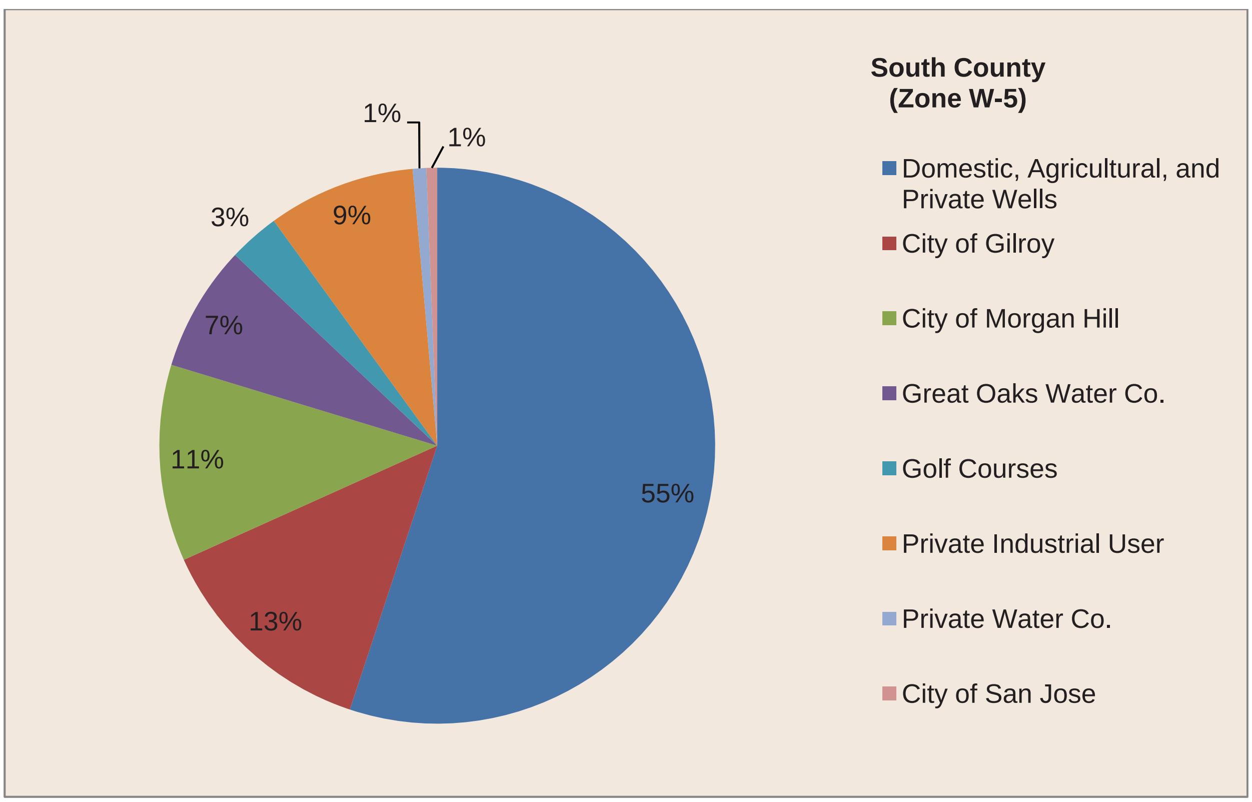


Figure 8 Percent of Total Pumping by Major Groundwater Users in 2015

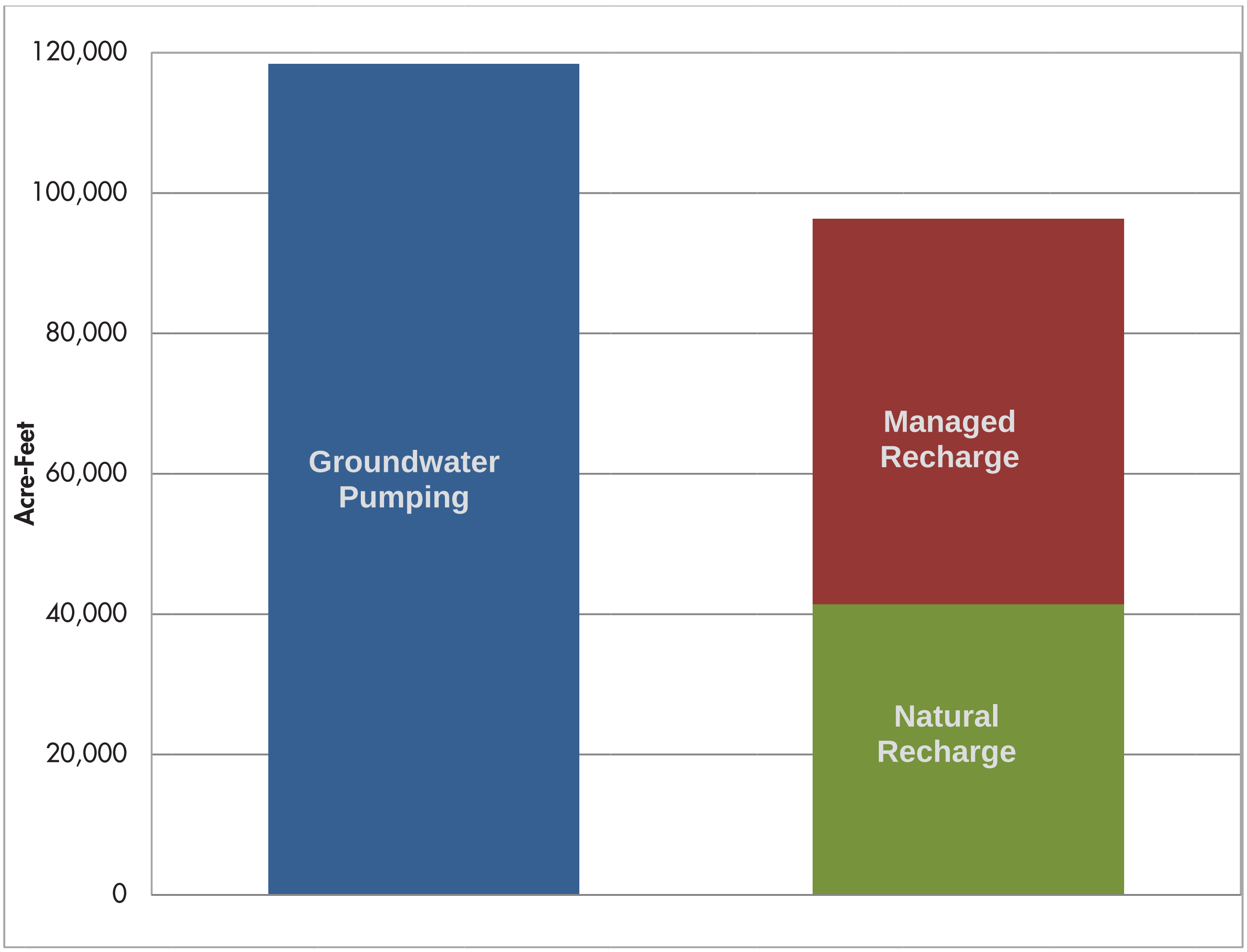




2.2 Groundwater Recharge

Since the 1930s, the District's water supply strategy has been to maximize the conjunctive management of surface water and groundwater. The annual amount of groundwater pumped far exceeds what is replenished naturally by rainfall, so the District's managed recharge and in-lieu recharge activities are critical to ensuring water supply reliability (Figure 9). Groundwater pumping exceeded total recharge in 2015 due to the reduced availability of surface water for managed recharge as a result of continued dry conditions.

Figure 9 Countywide Groundwater Pumping and Recharge in CY 2015



Managed Recharge

The District replenishes the groundwater subbasins with imported water and local runoff captured in 10 local reservoirs. District recharge facilities include more than 300 acres of recharge ponds and over 90 miles of creeks (Figure 10). Imported sources include the federal Central Valley Project (CVP) and the State Water Project (SWP). The use of imported or local water for managed recharge in a given year depends on a number of factors including hydrology,

imported water allocations, treatment plant demands, and environmental needs. In general, a greater percentage of local water is used for recharge in wet years due to increased capture of local storm runoff in local reservoirs.

About 54,900 AF of local and imported water was recharged through District facilities in CY 2015 (Table 4). This represents only about 50% of the managed recharge program in normal years. The low recharge volume was due to limited supplies of local and imported surface water due to continued drought. Approximately 62% of the District managed recharge was in-stream recharge. Approximately equal amounts of local and imported water were recharged in South County, while imported water accounted for about 83% of the water recharged in North County (Figure 11).

Table 4 CY 2015 Managed Recharge (AF)

Zone	In-Stream Recharge (Creeks)	Off-Stream Recharge (Recharge Ponds)	Total
W-2 (North County)	11,600	16,600	28,200
W-5 (South County)	22,300	4,400	26,700
Total	33,900	21,000	54,900

The District's 10 reservoirs were constructed in the 1930s and 1950s. Based on recent seismic studies, operating restrictions have been imposed on several District reservoirs while seismic stability concerns are mitigated. This limits the amount of water that can be stored for groundwater recharge, but is needed to provide an adequate level of safety to the public downstream and prevent the uncontrolled release of water while related retrofit projects to strengthen the dams are implemented. Major upcoming capital projects include seismic retrofit of Anderson, Calero, Guadalupe, and Almaden dams.

In-Lieu Recharge

The District's treated surface water deliveries, water conservation, and recycled water programs play a critical role in maintaining groundwater storage by reducing demand on groundwater. In 2015, treated water and recycled water provided about 94,500 and 20,000 AF of water, respectively. The District's long-term water conservation programs also saved approximately 64,000 AF[6].

The District's Silicon Valley Advanced Water Purification Center began operating in 2014. This state-of-the-art facility in San Jose produces up to 8 million gallons per day of highly purified water by treating tertiary-treated recycled water with microfiltration, reverse osmosis, and ultraviolet light. Purified water is blended with tertiary treated recycled water to lower the salt content of recycled water used for landscape irrigation and industrial uses. This facility supports the District's goal of expanding the use of recycled water, which reduces the demand on groundwater.

[6] Santa Clara Valley Water District, Protection and Augmentation of Water Supplies, FY 2016-17, 45th Annual Report, February 2016.

Figure 10 District Managed Recharge Facilities

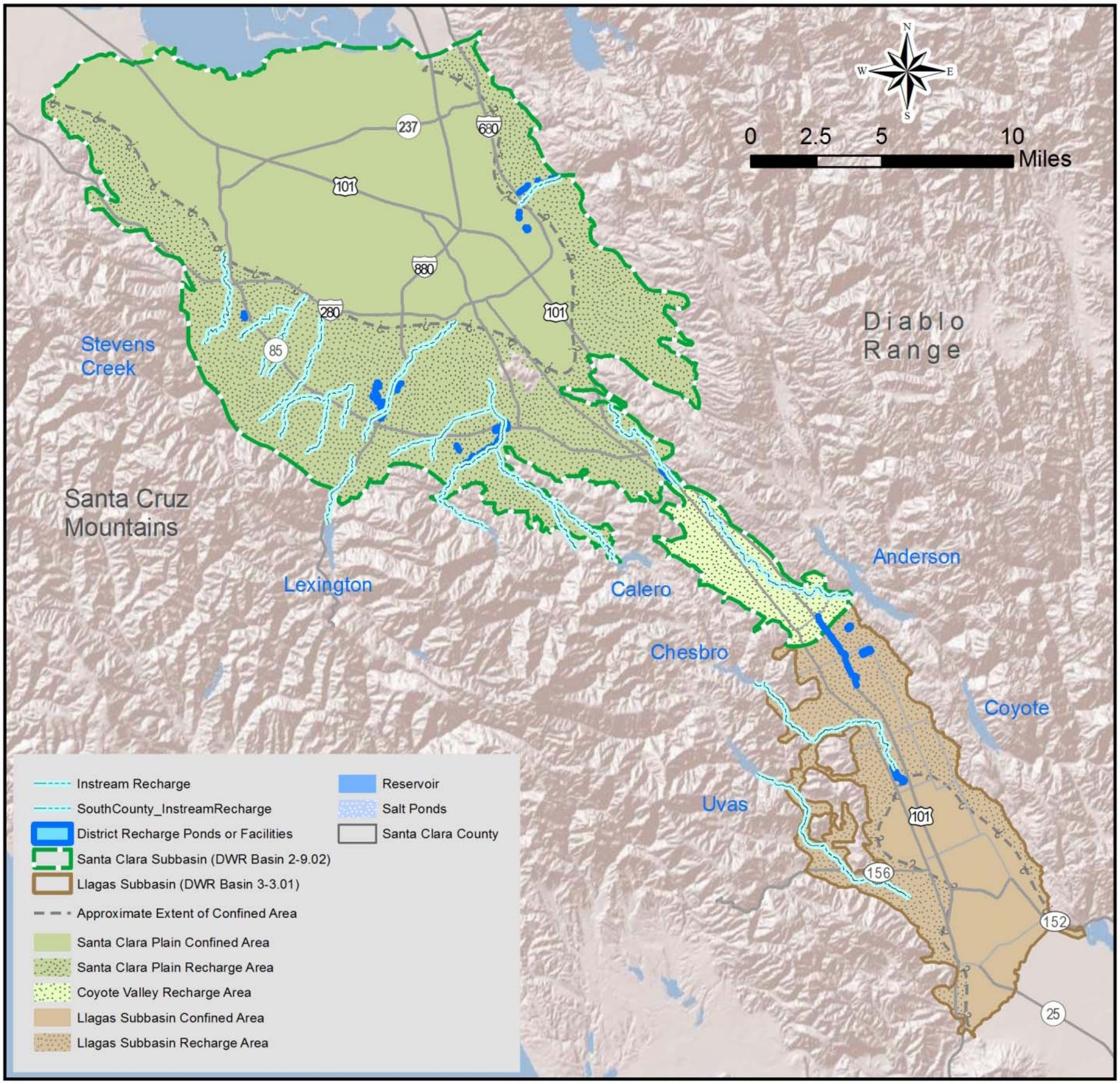
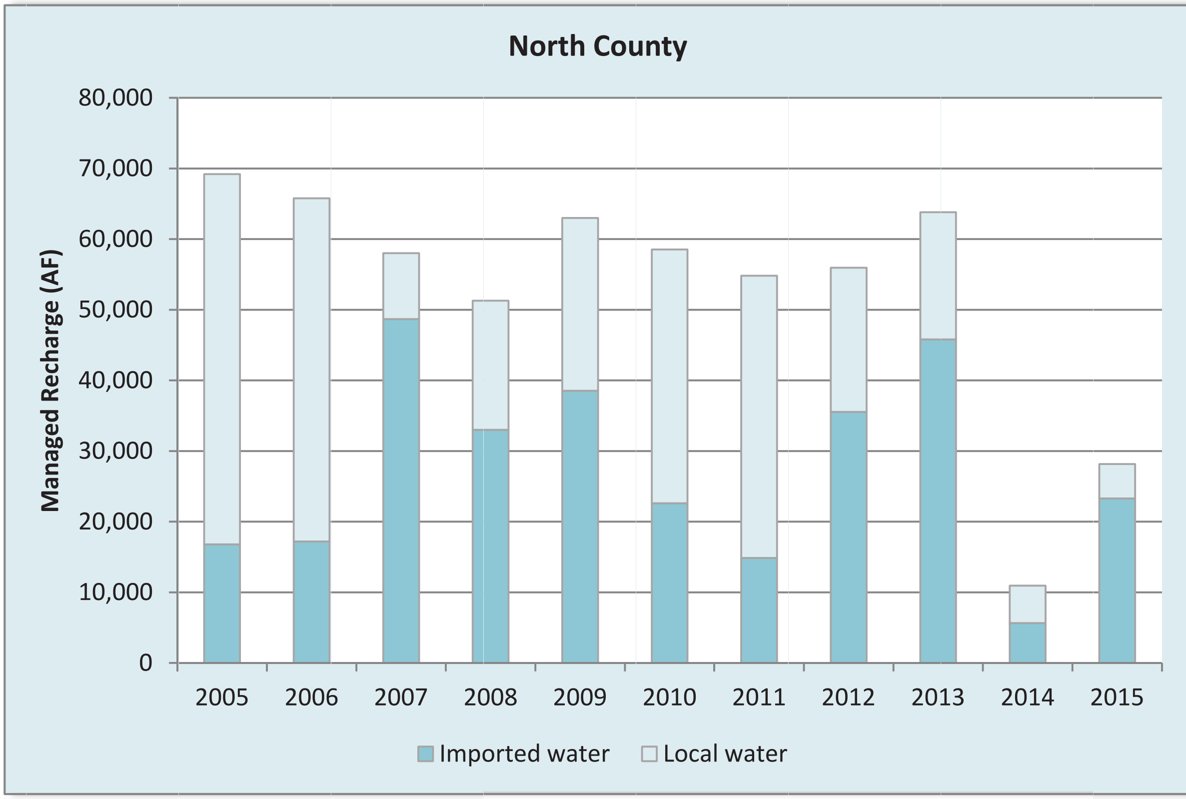
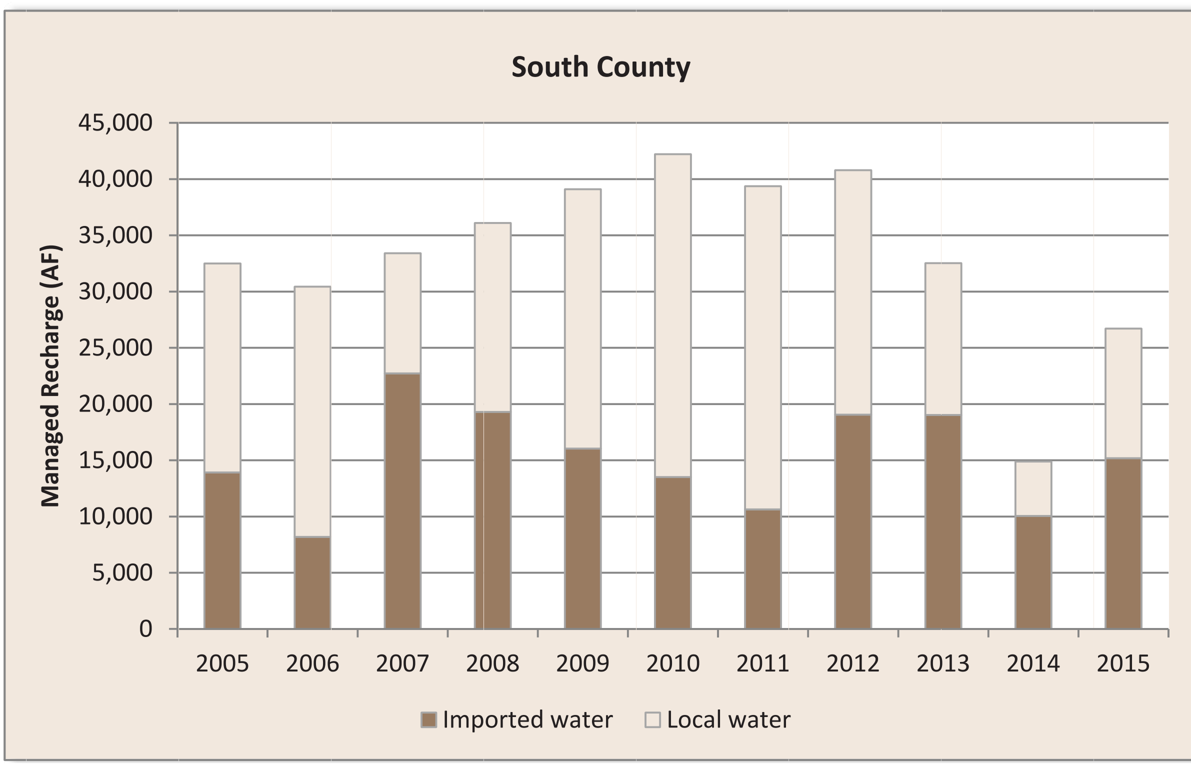


Figure 11 **Managed Recharge By Source**





2.3 Groundwater Balance

The groundwater balance provides an assessment of annual inflows and outflows for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, as shown in Figure 12. It should be noted that some terms presented in the groundwater balance cannot be directly measured and represent estimated values from the District's groundwater flow models.

Inflows

Major inflows to the subbasins are primarily controlled by hydrologic conditions and include:

- Managed recharge by the District using local and imported surface water, and
- Natural recharge, which includes deep percolation of rainfall, natural seepage through creeks, subsurface inflow from adjacent aquifer systems (Coyote Valley and Bolsa Subbasin), and return flows from septic systems and irrigation.

Total inflows to the subbasins were 96,300 AF in 2015, with natural recharge and other inflows providing about 43% of the total. Managed recharge provided about 57% of total inflows.

Outflows

The primary outflow of groundwater is pumping, which accounted for about 97% of the total outflow of 122,600 AF in CY 2015. Subsurface outflow to adjacent aquifer systems was about 4,200 AF, or about 3% of the total outflow.

Change in Storage

Based on the estimated inflows and outflows, there was an estimated decrease in storage of 26,300 AF in CY 2015 due to ongoing dry conditions and reduced managed recharge. Storage in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin decreased by about 19,800 AF, 5,000 AF, and 1,500 AF, respectively.

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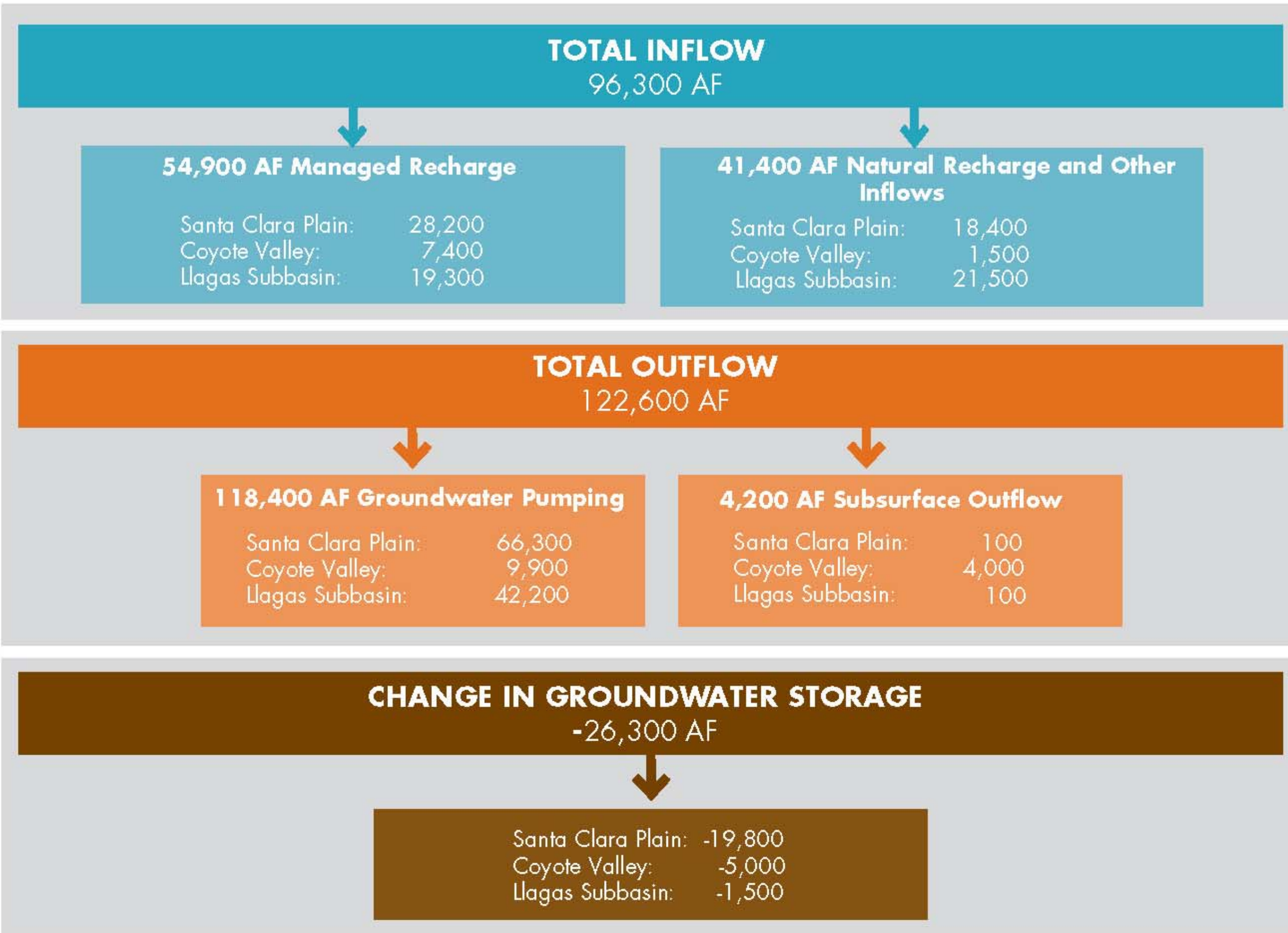
Figure 12 CY 2015 Groundwater Balance



Notes:
1) Groundwater balance terms presented are estimates as of March 2016, and are refined as additional data becomes available. Values shown are based on measured quantities or calibrated groundwater flow models, with all values rounded to the nearest 100 AF.
2) Managed recharge represents direct replenishment by the District using local and imported water. Estimates from the groundwater models may differ slightly from surface water accounting estimates.
3) Natural recharge and other inflows include the deep percolation of rainfall, septic system and/or irrigation return flows, natural seepage through creeks, and inflow from adjacent aquifer systems.
4) The groundwater pumping estimate is based on pumping measured by the District or reported by water supply well owners.
5) Subsurface outflow represents outflow to adjacent aquifer systems. In the Santa Clara Plain, this includes outflows to San Francisco Bay. In Coyote Valley, this includes outflow to the Santa Clara Plain, and in the Llagas Subbasin, this includes outflows to the Bolsa Subbasin in San Benito County.

3. Groundwater Levels and Storage

The District collected monthly water level measurements from 220 wells in CY 2015, and also evaluated water levels from 110 wells measured by water retailers. Groundwater levels at regional groundwater level index wells were generally higher than 2014 in the Santa Clara Plain and Coyote Valley due to improved rainfall; however, water levels were slightly lower in the Llagas Subbasin. Estimated end of year groundwater storage decreased by 26,300 AF from between 2014 and 2015 mainly due to limited managed recharge in the Santa Clara Plain. The GWMP storage target was not met for all three groundwater management areas in CY 2015 and the projected end of year storage for CY 2016 is below the 300,000 AF target. In accordance with the Water Shortage Contingency Plan, the District set a 30% water use reduction target in March 2015. Countywide, water retailers achieved a water use reduction of 27% in CY 2015 when compared to CY 2013. Groundwater reserves decreased in CY 2015, but much less than in CY 2014.

3.1 Groundwater Levels

Comprehensive and accurate monitoring data allows the District to evaluate groundwater level and storage conditions to support operational decisions and water supply planning efforts. The District measured depth to water data from 220 wells on a daily or monthly basis as shown in Figure 13. The District also evaluated water levels from 110 water supply wells measured by water retailers. As the designated monitoring entity for Santa Clara County under the California Statewide Groundwater Elevation Monitoring (CASGEM) program, the District uploaded almost 1,100 groundwater elevation measurements to the CASGEM website in CY 2015.

Three groundwater level index wells are used to represent regional groundwater elevations in the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin (Figure 14). Table 5 shows March and October groundwater elevations for the index wells, which typically represent the seasonal high and low groundwater elevations, respectively. Due to improved rainfall, average groundwater elevations were 8 feet higher than the previous year in the Santa Clara Plain, 2 feet higher in Coyote Valley and 4 feet lower in the Llagas Subbasin. Groundwater elevations remained above the historically observed minimums and levels seen during the last major drought of 1987-1992 (Figure 13). Groundwater elevations were also above the thresholds established to minimize the risk of land subsidence in all 10 subsidence index wells throughout 2015 (see Section 4).

In the Santa Clara Subbasin, groundwater elevations are highest in the Coyote Valley and the recharge areas of the Santa Clara Plain. Groundwater elevations generally decrease within the interior, confined area of the subbasin, and the general groundwater flow direction is northwest toward San Francisco Bay (Figure 15). The District's managed recharge helps maintain adequate pressure in the principal aquifer zone such that groundwater flows toward the bay and maintains an upward vertical gradient near the bay. The upward gradient minimizes the potential for saltwater intrusion into the principal aquifers.

Groundwater elevation contours for the principal aquifer zone in March and October of 2015 are shown in Figures 15 and 16, respectively. The typical seasonal pattern is higher groundwater levels in the spring and lower levels in the fall due to increased pumping and less natural recharge in the summer and fall. However, this was not observed in CY 2015 because water savings increased as the year progressed and pumping was reduced in the summer months, which is atypical. Groundwater levels in the central portion of the Santa Clara Plain increased between spring and fall due to drought response; groundwater pumping was significantly reduced and there was increased managed recharge compared to the previous year. The October 2015 contours indicate that groundwater elevations in the interior of the Santa Clara Plain have recovered significantly as compared to October 2014.

Table 5 Groundwater Elevations at Regional Index Wells (feet above mean sea level)

Groundwater Subbasin/Area	Index Well	March 2015	October 2015	2015 Average	2014 Average	5 Year Average (2010-2014)	Period of Record Average
Santa Clara Subbasin, Santa Clara Plain	07S01W25L001	40.4	60	49.8	41.3	64.4	8.0
Santa Clara Subbasin, Coyote Valley	09S02E02J002	265.0	251.1	259.3	257.7	264.4	264.3
Llagas Subbasin	10S03E13D003	197.9	178.2	188.9	193.2	220.1	219.0

Note: The period of record for the index wells is 1936-2015 for the Santa Clara Plain, 1948-2015 for the Coyote Valley, and 1969-2015 for the Llagas Subbasin.

The groundwater flow patterns observed in Coyote Valley were similar to those observed in the past, with groundwater flow generally toward the northwest. The highest groundwater elevations in the Llagas Subbasin are in the recharge area in Morgan Hill, and groundwater generally flows southeast toward the Pajaro River and San Benito County. Managed and natural recharge within the recharge area maintains groundwater pressures within the confined area, where groundwater exists in partially to fully confined conditions.

3.2 Groundwater Storage

Estimated groundwater storage at the end of 2015 was below the GWMP outcome measure of 300,000 AF, and 26,300 AF lower than at the end of 2014 (Table 6). End of year groundwater storage of less than 300,000 AF indicates a potential for water shortages in the next year, per the District's Water Shortage Contingency Plan. Due to ongoing dry conditions, the projected end of year storage for 2016 is well below the 300,000 AF target. The District Board maintained the 30% water use reduction target through June 2016, when the target was reduced to 20% in light of improved water supplies.

Table 6 Estimated End of Year Groundwater Storage (AF)

Groundwater Subbasin/Area	GWMP Outcome Measure	End of Year 2014	End of Year 2015	Change in Storage
Santa Clara Subbasin Santa Clara Plain	278,000	234,600	214,800	-19,800
Santa Clara Subbasin Coyote Valley	5,000	5,400	400	-5,000
Llagas Subbasin	17,000	15,400	13,900	-1,500
Total	**300,000**	**255,400**	**229,100**	**-26,300**

Note: Groundwater storage estimates presented are as of March 2016. These estimates are based on accumulated groundwater storage since 1970, 1991, and 1990 for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, respectively. These estimates are refined as additional pumping and managed recharge data become available.

Figure 13 CY 2015 Groundwater Level Monitoring

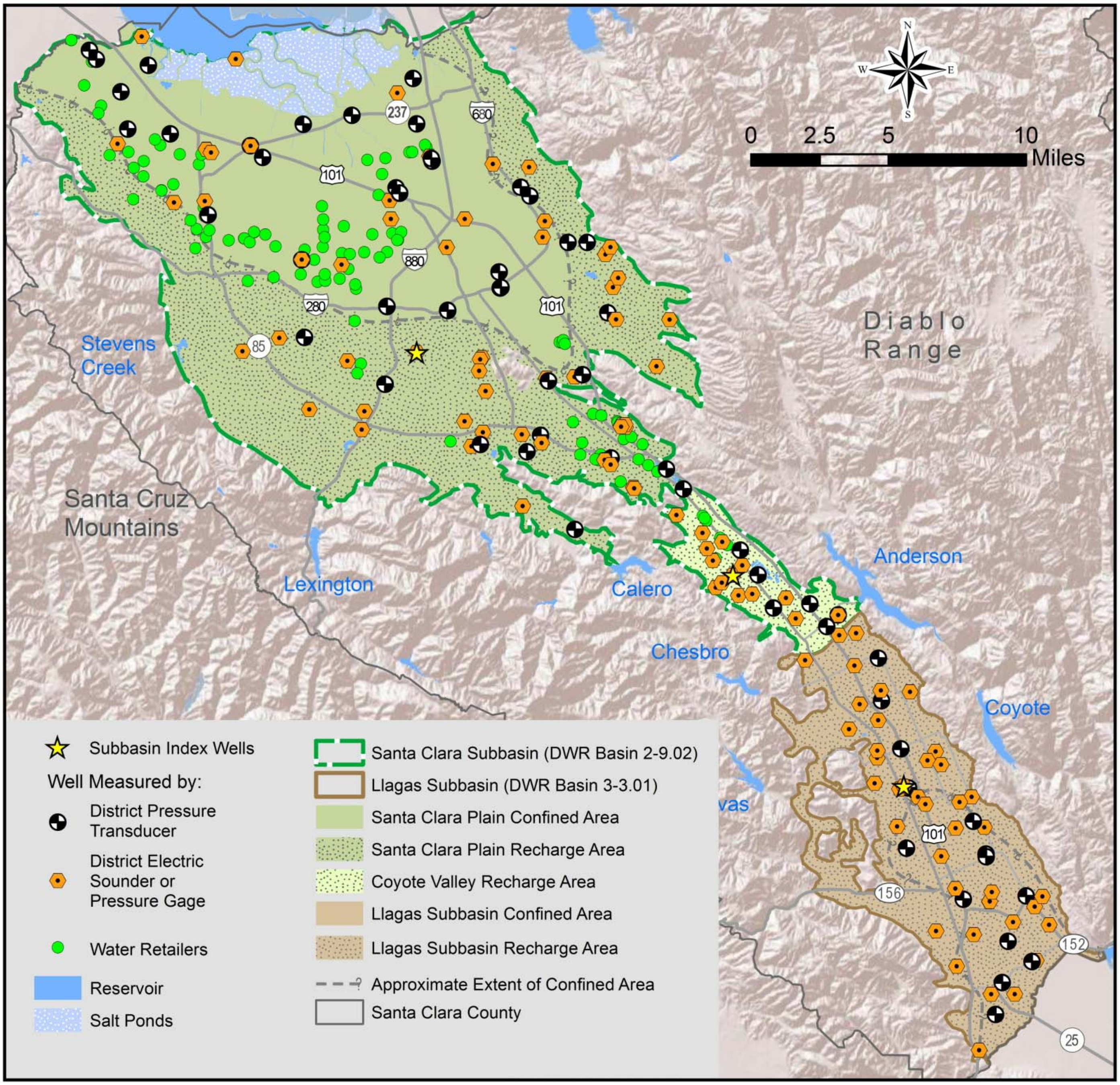
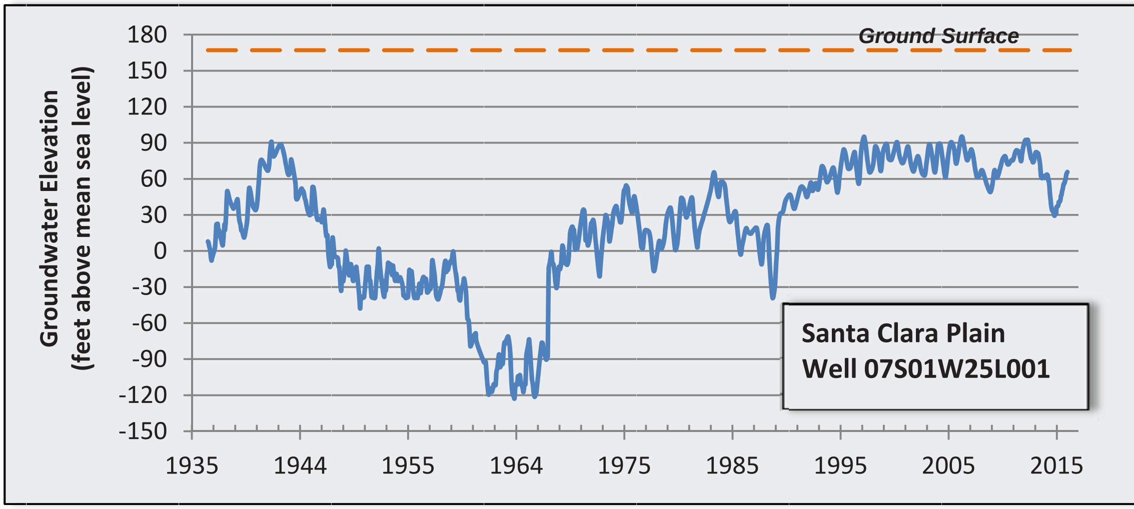
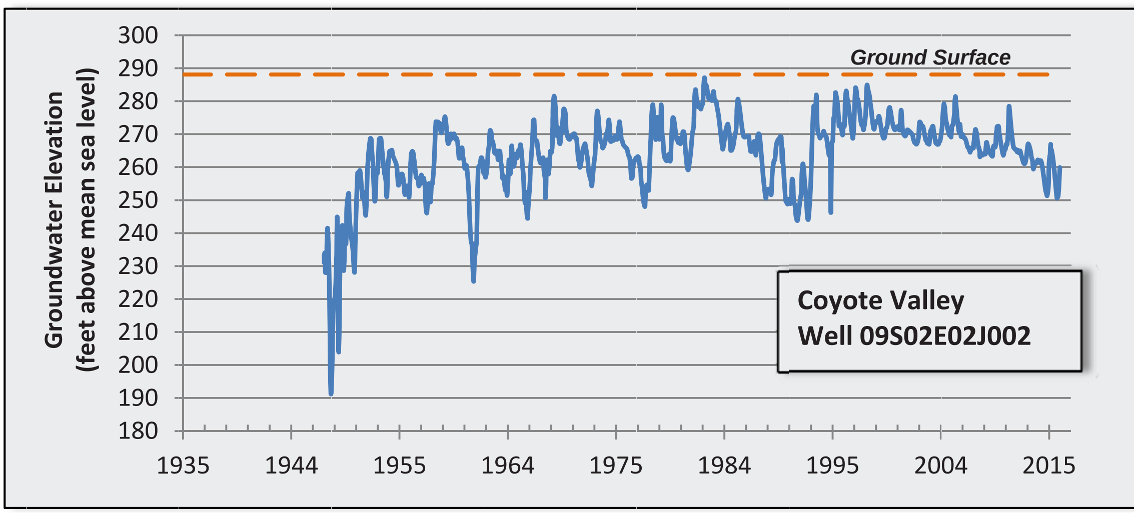


Figure 14 Groundwater Elevations at Regional Index Wells





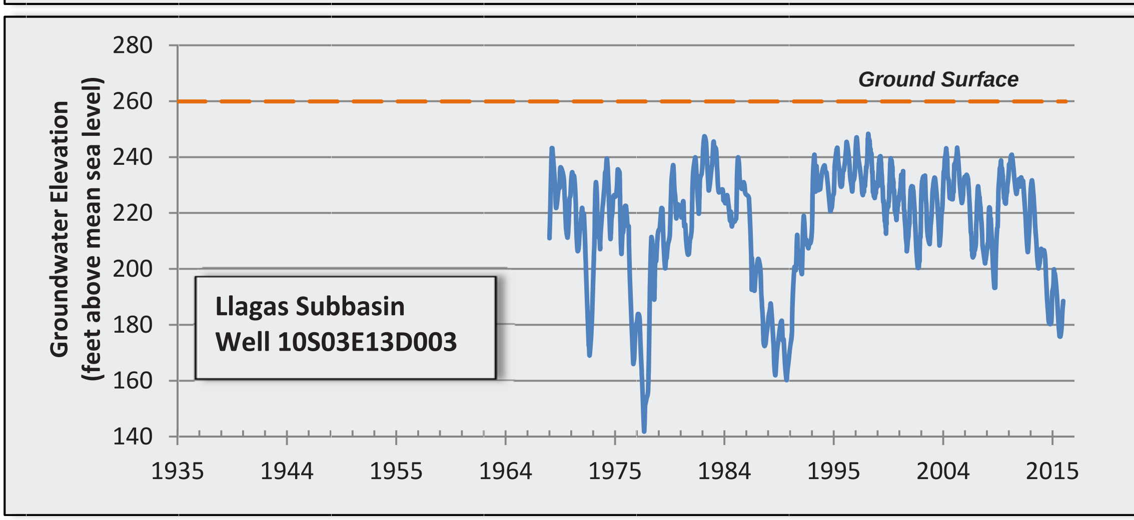


Figure 15 Spring 2015 Groundwater Elevation Contours

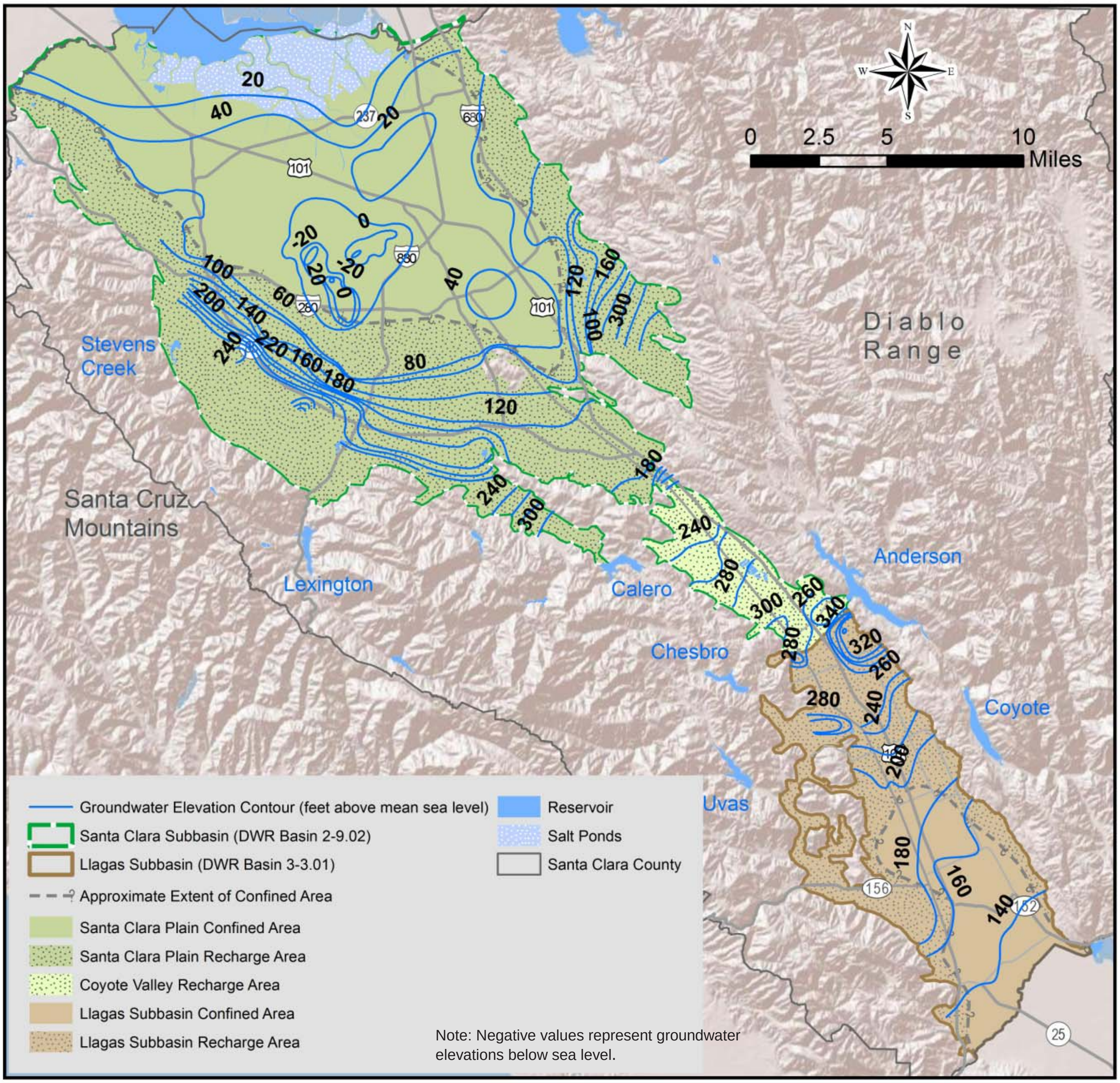
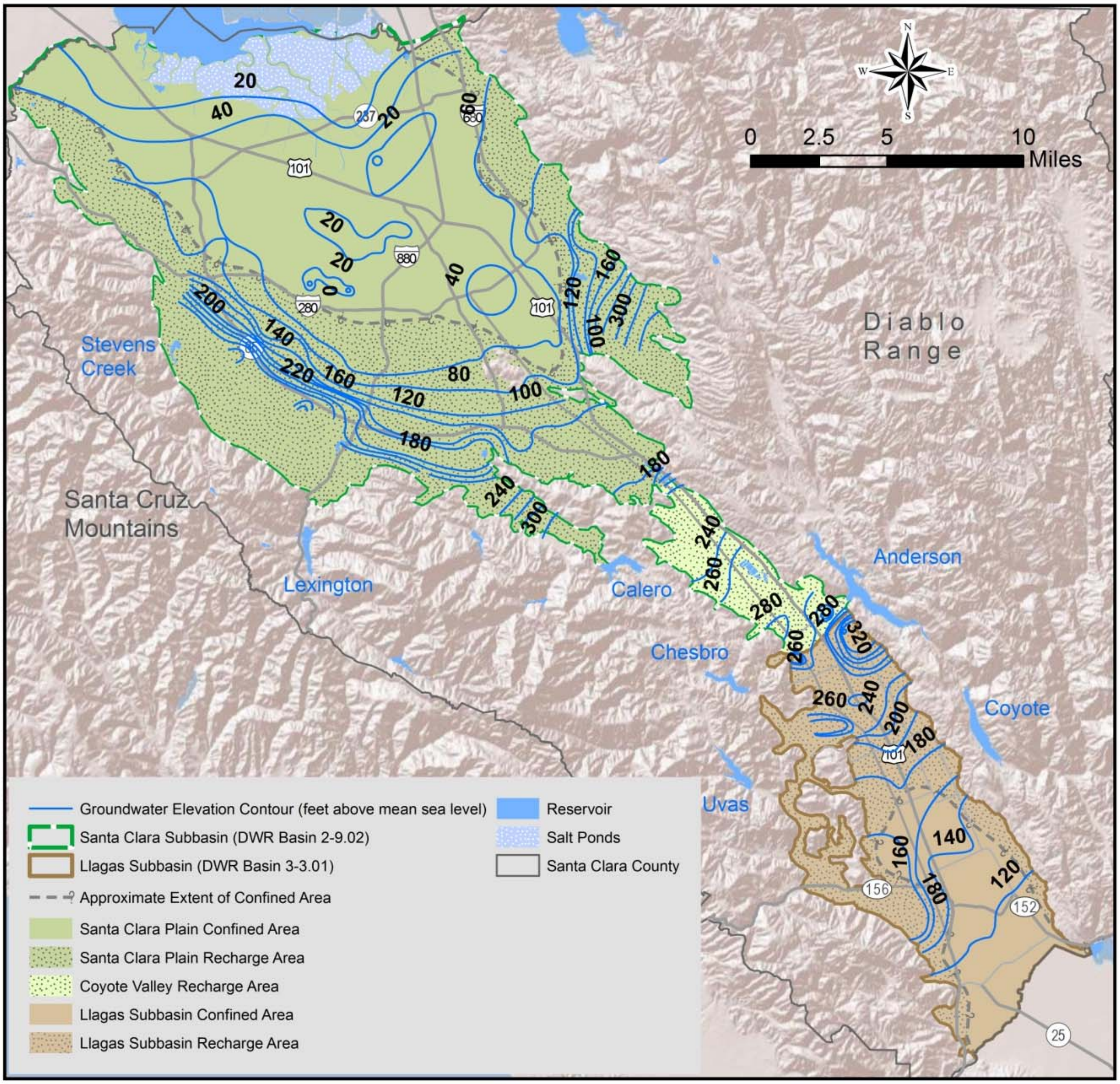


Figure 16 Fall 2015 Groundwater Elevation Contours



Groundwater Storage Outcome Measures

OM 2.1.1.a.
Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain.

OM 2.1.1.b
Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.

OM 2.1.1.c.
Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.

The outcome measures for the Santa Clara Plain, Coyote Valley and Llagas Subbasin were not met in 2015, with an estimated end of year storage of 214,800 AF, 400 AF, and 13,900 AF, respectively. Based on the significant storage decline since 2013 and ongoing drought conditions, it is likely that the storage targets for all three groundwater areas will not be met in 2016.

4. LAND SUBSIDENCE

In CY 2015, the District measured subsidence at 145 benchmarks along three cross valley level circuits and two extensometers. Water levels at ten subsidence index wells were also monitored and compared to thresholds established to minimize the risk of permanent land subsidence. In CY 2015, all subsidence outcome measures were met.

The Santa Clara Plain is vulnerable to land subsidence with about 13 feet of inelastic (permanent) land subsidence observed in San Jose between 1915 and 1969 due to groundwater overdraft. Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive management programs, which allowed artesian heads to recover. A minor amount of elastic subsidence and recovery occurs annually in response to seasonal pumping and recharge as indicated by extensometer measurements, benchmark surveys, and Interferometric Synthetic Aperture Radar (InSAR)[7] data. To avoid resumption of permanent inelastic subsidence, the District has established subsidence thresholds at ten index wells in the Santa Clara Plain[8]. A tolerable rate of 0.01 feet per year of subsidence[9] was used to determine thresholds at these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of land subsidence.

The District conducts ongoing monitoring of benchmarks on the land surface, extensometers, and groundwater levels at subsidence index wells to determine if land subsidence is occurring or threatening to exceed established thresholds. Subsidence monitoring points are shown in Figure 17. Monitoring data in 2015 from extensometers, benchmark surveys, and subsidence index wells indicates a low risk of subsidence, as described further below.

4.1 Extensometer Monitoring

The District monitors two 1,000-foot deep extensometers that measure vertical ground motion (or aquifer compaction) relative to a central, isolated pipe set beneath the water bearing units. The extensometers are located in Sunnyvale near Moffett Field ("Sunny") and near downtown San Jose ("Martha"), and are equipped with data loggers to provide hourly readings of aquifer compaction and water level. The District evaluates the average land subsidence measured during the last 11 years to determine if it meets the tolerable rate of land subsidence of 0.01 feet/year.

Figure 18 shows cumulative compaction measured at the extensometers for the period of record supplemented with nearby benchmark data. These figures indicate that land subsidence conditions over the last few decades have been relatively stable. The figures also show close correlations between the District's land subsidence model, which is used to forecast land subsidence, and actual measured data. Measured data show a negative compaction (i.e., aquifer expansion) at both sites in 2015. The average subsidence rate over the last 11 years (2005 to 2015) is 0.005 feet/year, which is below the tolerable subsidence rate of 0.01 feet/year. The average for the previous period (2004 to 2014) was 0.008 feet/year. The decreased average subsidence rate results from groundwater level recovery in 2015. Measured compaction is within the elastic range observed historically, but vigilant land subsidence monitoring and analysis are critical as the drought continues.

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[7] Schmidt, D.A. and Burgmann, R., Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, Journal of Geophysical Research, Volume 108, No. B9, 2003.

[8] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

[9] The tolerable subsidence rate of no more than 0.01 feet per year on average was endorsed by the District's Water Retailer Groundwater Subcommittee.

Figure 17 CY 2015 Land Subsidence Monitoring

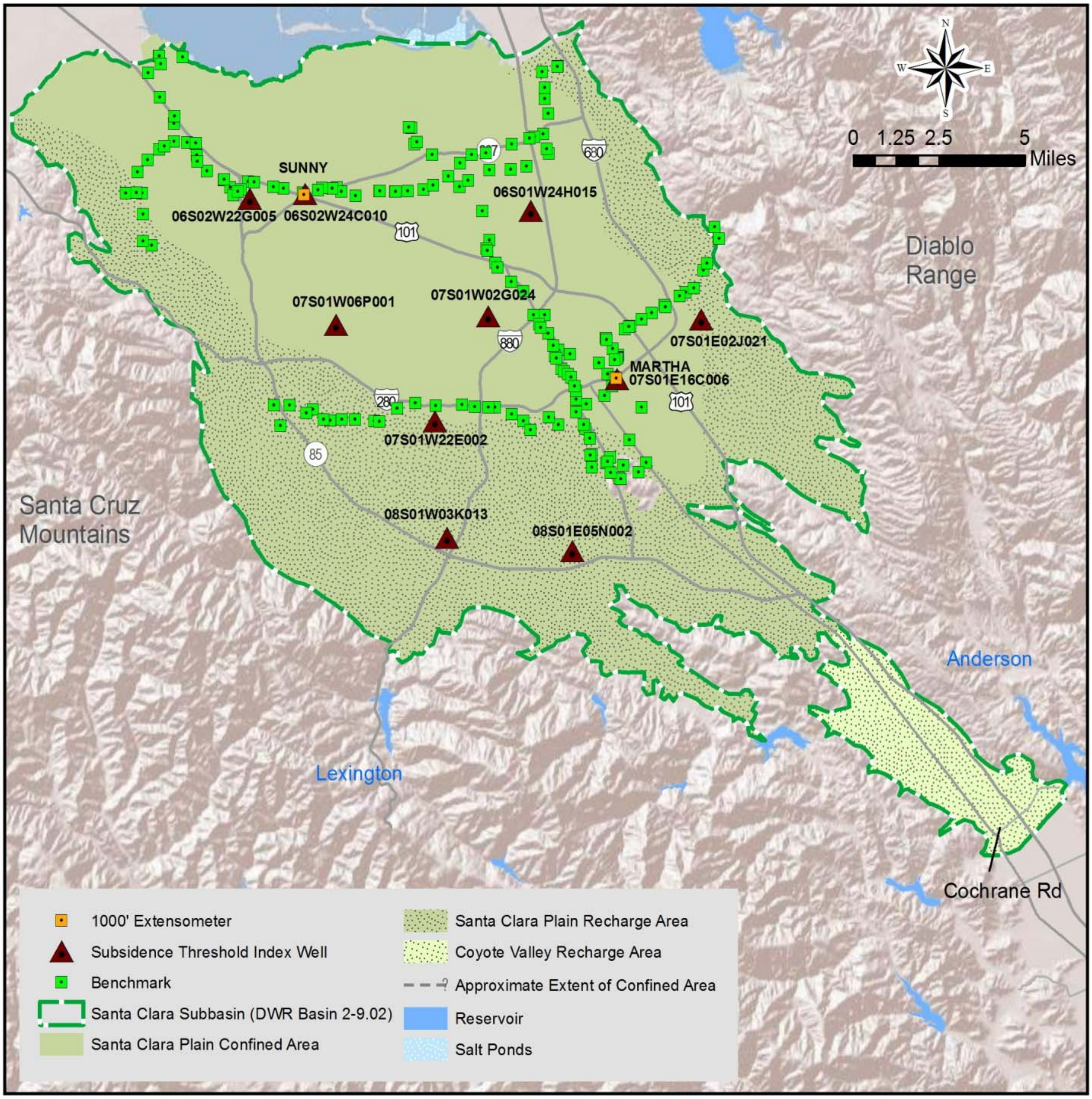
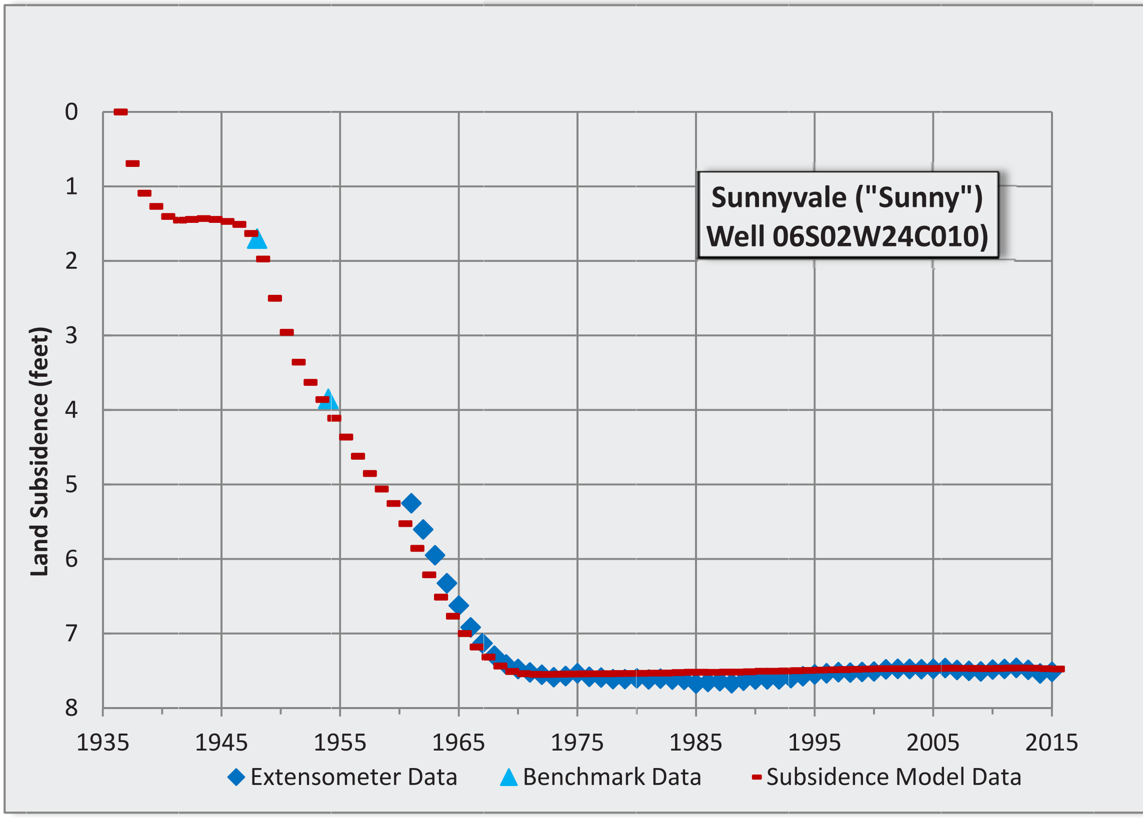
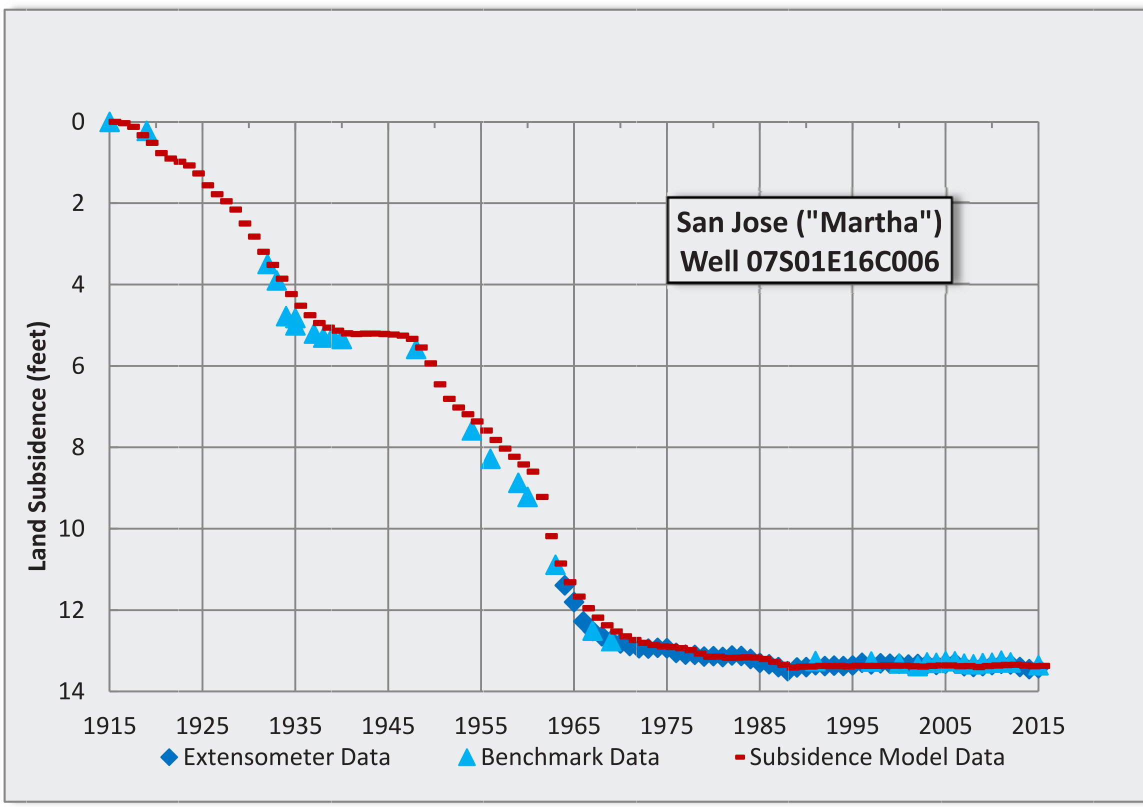


Figure 18 Cumulative Land Subsidence





4.2 Benchmark Elevation Surveys

Periodic benchmark surveys of land surface elevation have been conducted in Santa Clara County since 1912[10]. The District's current benchmark leveling program consists of annual surveys along three cross valley level circuits in the Santa Clara Plain. In 2015, the District analyzed land surface elevation data from 145 benchmarks to evaluate the spatial variability of land subsidence. Survey data at a majority of benchmarks show the land surface rising in 2015 due to significantly decreased pumping and increased recharge. Regional benchmark data is consistent with extensometer data, indicating the average annual change of land surface over the last 11 years does not exceed the tolerable rate of subsidence of 0.01 feet per year.

4.3 Subsidence Index Wells

Groundwater level measurements are an integral part of land subsidence monitoring because declining water levels due to long-term overdraft were the driving force of historical subsidence in the Santa Clara Plain. The District measures water levels at ten subsidence index wells on a daily to monthly basis to ensure they remain above established thresholds. If water levels drop below subsidence thresholds for extended periods, permanent land subsidence may resume, resulting in an increased risk of flooding, salt water intrusion, and damage to infrastructure and utilities.

Figure 19 shows groundwater levels and subsidence thresholds at ten subsidence index wells. The lowest historical water levels were generally observed in the 1960s and 1970s. Since then, groundwater levels have recovered, primarily due to the District's managed recharge and in-lieu recharge programs. In general, groundwater levels in 2015 were in recovery from water level declines in the previous year. End of 2015 water levels improved in 9 of 10 subsidence index wells and they slightly declined in one well. Three subsidence index wells located near the Baylands continue to have upward vertical gradients. In addition to keeping water levels above subsidence thresholds, maintaining an upward hydraulic gradient in principal aquifer zone wells is critical for preventing shallow groundwater with elevated TDS from entering the principal aquifer through abandoned wells and other vertical conduits. In 2015, both conditions were met at those wells. The District will continue to frequently track data from the subsidence index wells to support water supply operations and planning.

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[10] USGS, Land Subsidence in the Santa Clara Valley, California as of 1982, Professional Paper 497-F, 1988.

Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level)

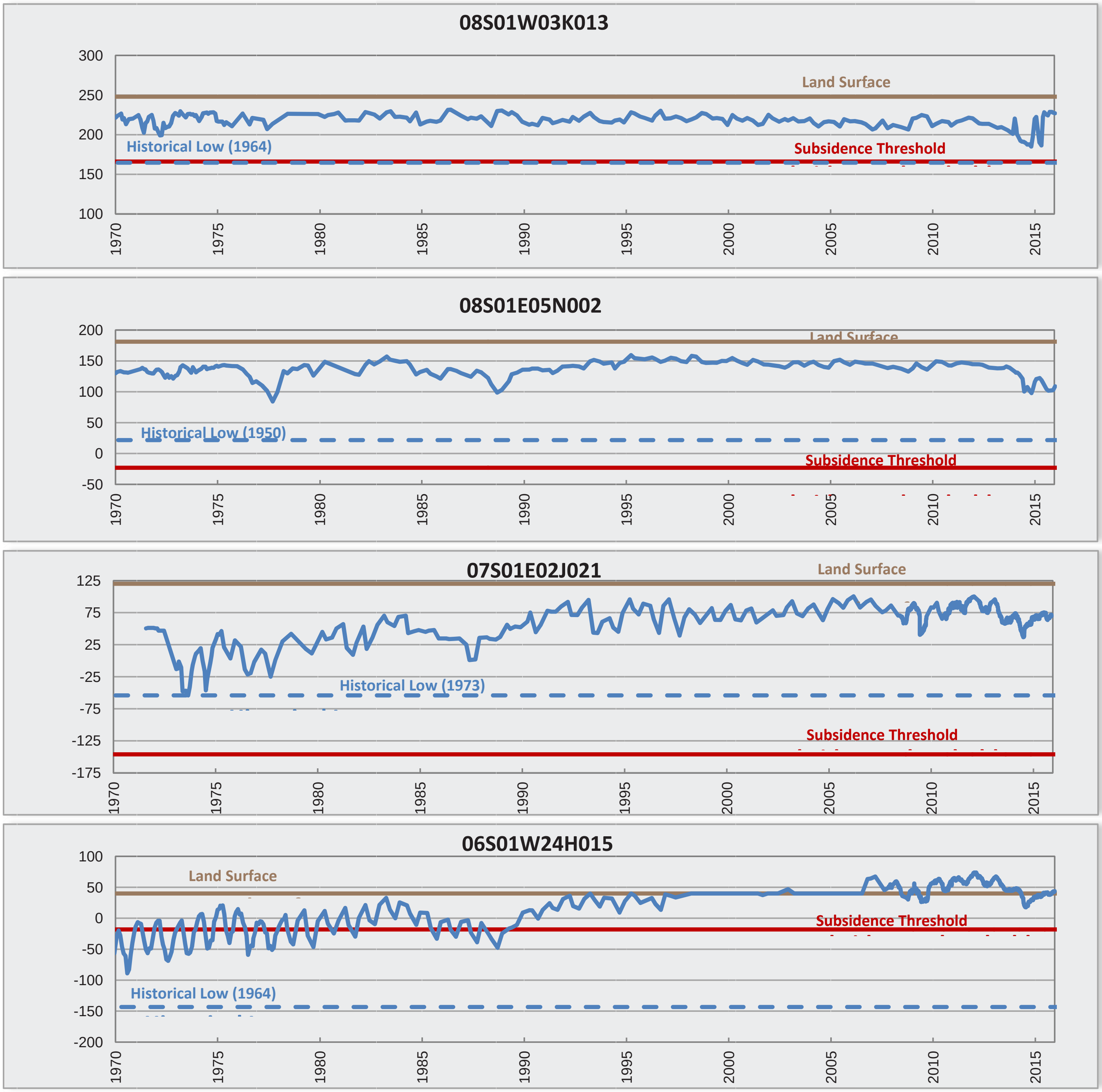
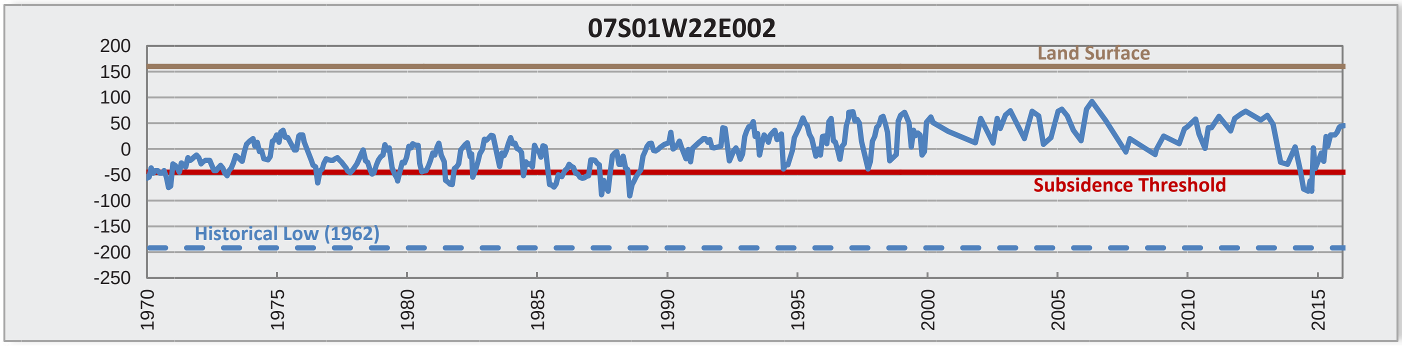
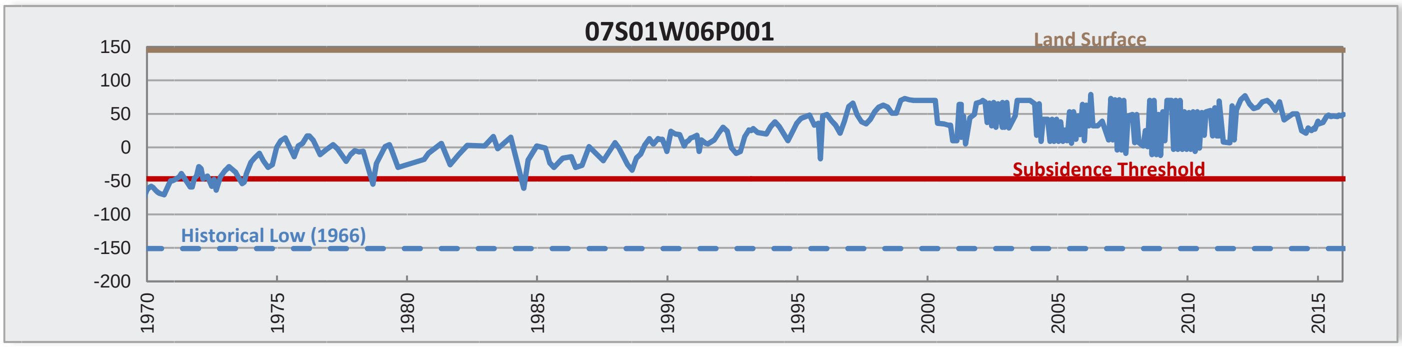
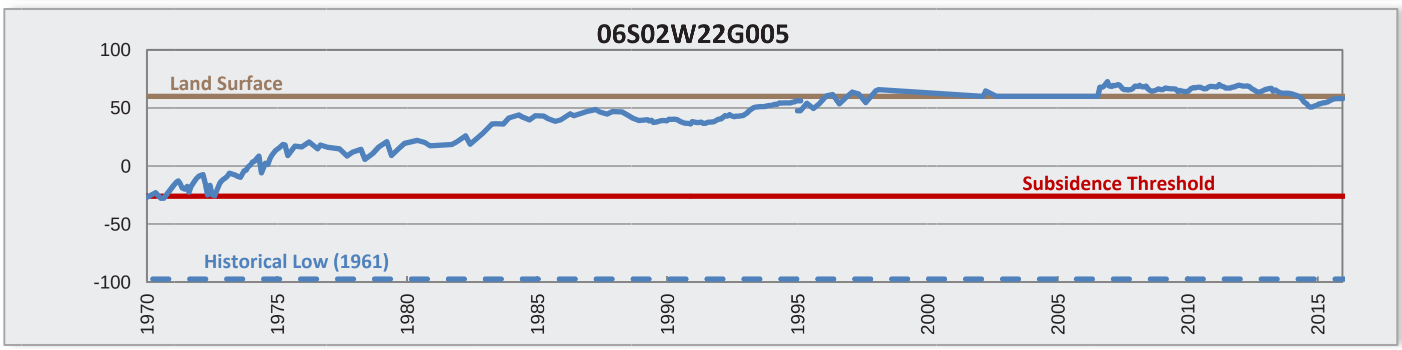


Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level, continued)







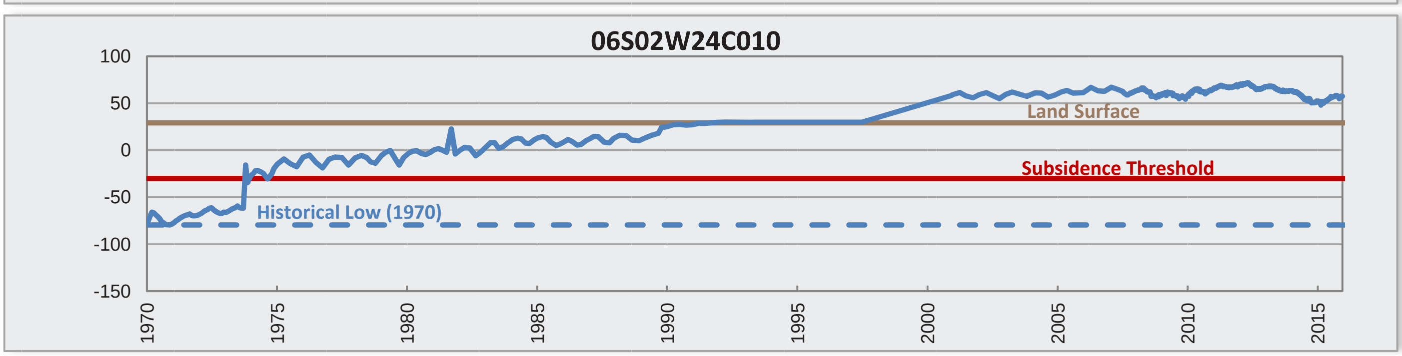
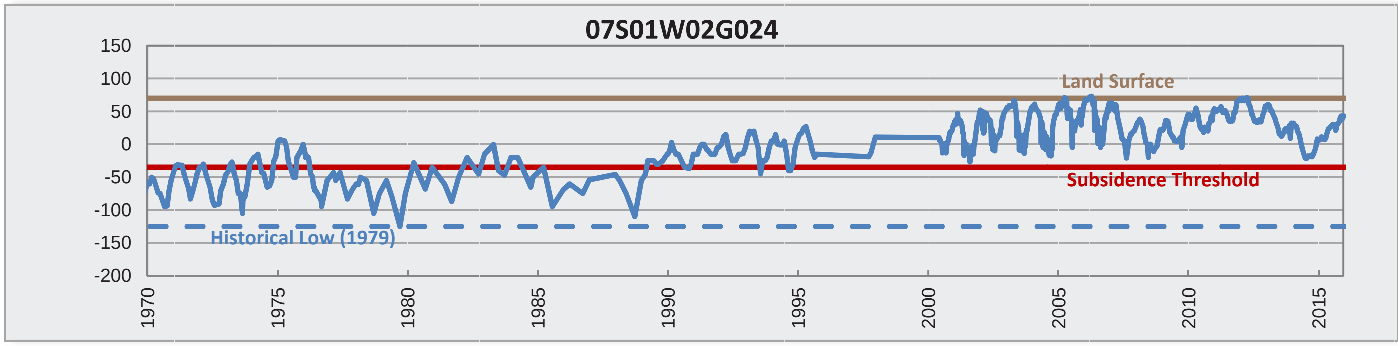
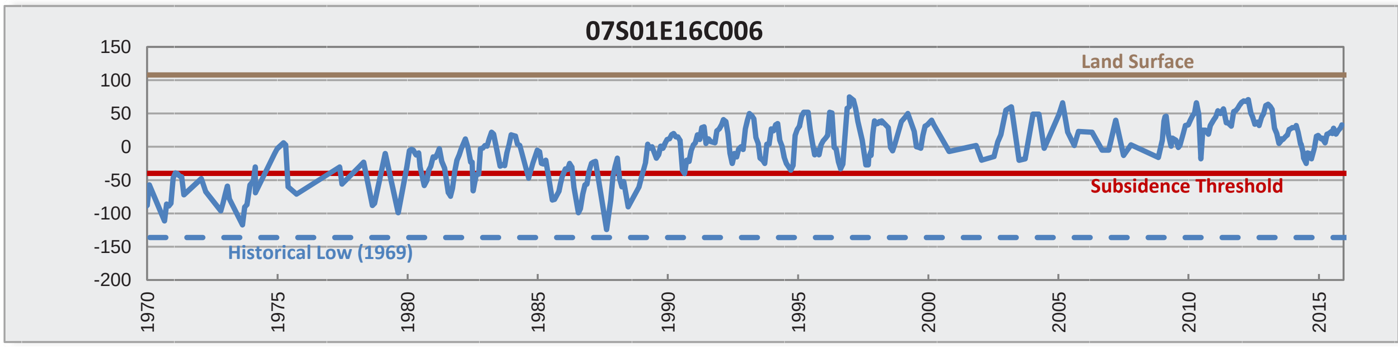


Figure 19 Groundwater Levels at Subsidence Index Wells (feet above mean sea level, continued)





Land Subsidence Outcome Measure

OM 2.1.1.d.
100% of subsidence index wells with groundwater levels above subsidence thresholds.

The outcome measure is met for calendar year 2015 as groundwater levels were above subsidence thresholds at all ten Santa Clara Plain subsidence index wells.

5. GROUNDWATER QUALITY

In CY 2015, the District tested groundwater quality at 318 wells, including 87 District monitoring locations, 214 domestic wells, and 17 wells near recycled water irrigation sites. The District also examined groundwater quality data from 225 public water supply wells and monitored recharge water quality at 8 locations.

Groundwater in the Santa Clara and Llagas Subbasins is generally of good quality that meets drinking water standards in most wells for all constituents tested. An exception is nitrate, which is elevated in 23% of South County water supply wells tested in 2015 (primarily domestic wells). Nitrate is present due to current and historic sources and primarily impacts private domestic wells. To address nitrate loading, the District completed Salt and Nutrient Management Plans in 2014 in coordination with basin stakeholders. The District continues to offer free water testing and rebates for nitrate treatment systems for domestic well users to reduce consumer exposure.

Samples were collected in September and December 2015 from the Los Gatos recharge system and the Upper Llagas recharge system. Results indicate recharge water quality continues to be of similar or better quality than groundwater for the parameters tested. Surface water quality indicators measured in CY 2015 were all within the normal range.

Past District groundwater monitoring near a recycled water irrigation study site in the Santa Clara Plain shows increasing trends for salts in some monitoring wells, as well as low-level detections of disinfection byproducts and other constituents. In 2015, recycled water irrigation monitoring wells at the Santa Clara Plain study site could not be sampled because they were dry due to the drought. In the Gilroy recycled water irrigation groundwater monitoring wells, disinfection byproducts are not detected, and salt concentrations are variable with no discernible trend. Perfluorinated compounds, which are also detected in recycled water, have been detected sporadically in several monitoring wells.

The District continues to coordinate with the state and federal agencies managing cleanup of groundwater contamination sites to track progress and issue recommendations for effective remediation measures. The District will continue to track water quality changes and work with stakeholders to identify ways to protect groundwater quality.

5.1 Regional Groundwater Quality

The District sampled groundwater quality at 87 wells, including 61 monitoring wells and 26 domestic wells, as part of the annual groundwater quality monitoring program (Figure 20)[11]. Seventy samples were analyzed for approximately 50 water quality parameters including major and minor ions, nutrients, and trace metals. Seventeen samples from monitoring wells near the San Francisco Bay were analyzed for 6 water quality parameters for saltwater intrusion monitoring. This report also incorporates data from 53 wells with known construction sampled through the District's domestic well sampling program. The District also evaluated data from 225 public water supply wells sampled by water retailers and reported to the State Water Resources Control Board Division of Drinking Water (DDW)[12].

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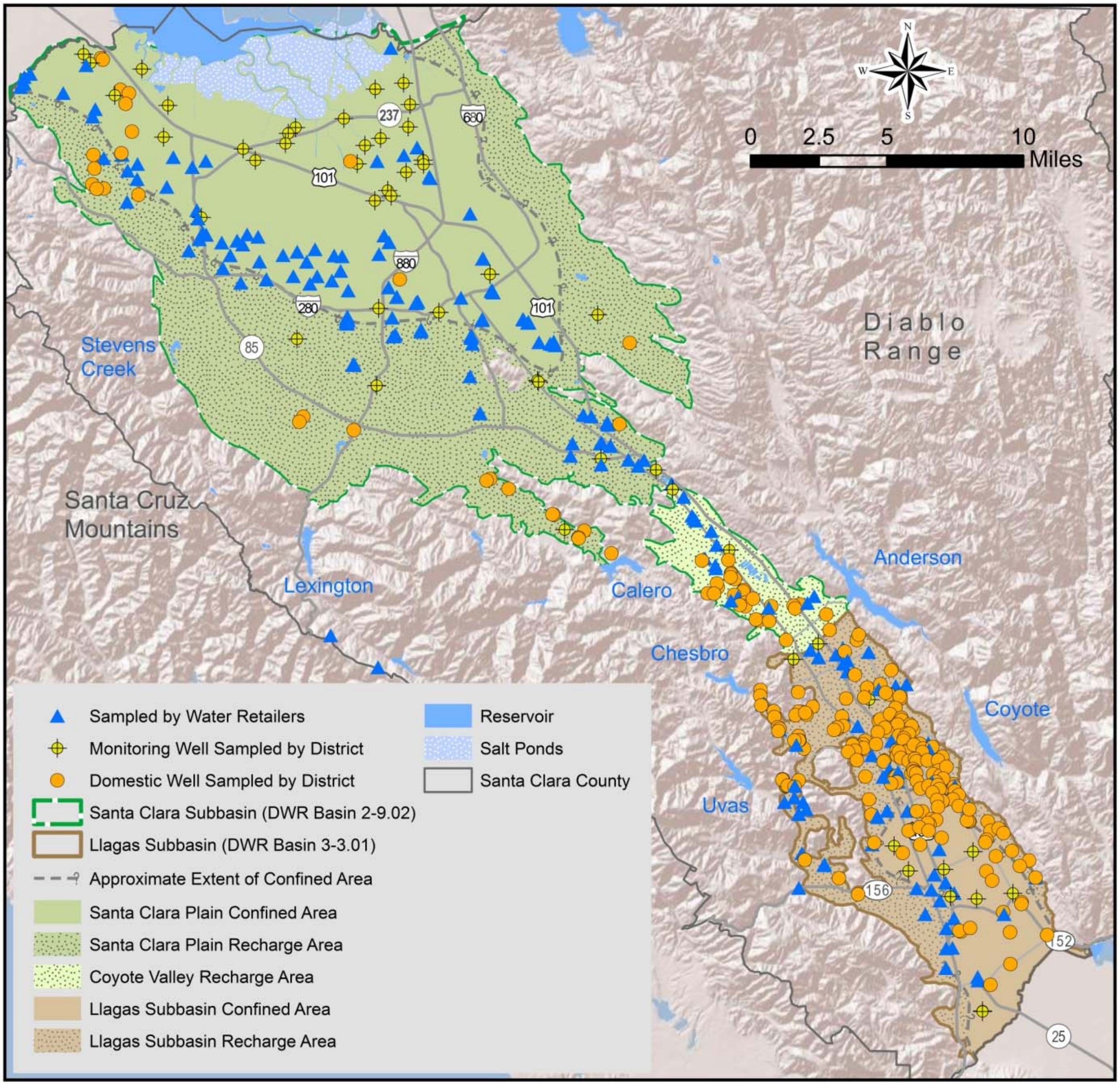
[11] The District also collected limited water quality data at 214 domestic wells in 2015 as part of the Domestic Well Testing Program. In addition to monitoring well data, data from the 53 domestic wells with available well construction information are summarized in this section, where results are grouped by subbasin and aquifer zone. The results for all domestic wells are summarized in Section 5.3.

[12] Formerly the California Department of Public Health (CDPH).

Figure 20 CY 2015 Groundwater Quality Monitoring Wells



To evaluate regional water quality conditions, the District determined water quality parameter median and range for each subbasin and aquifer zone[13] (Appendix B). Results indicate groundwater in the Santa Clara and Llagas Subbasins is generally of high quality. Water quality indicators, ions, and trace elements were within the normal range expected in groundwater, with the exception of nitrate. Elevated nitrate is primarily an issue in South County due to historic and ongoing sources including synthetic fertilizer, septic systems, and animal enclosures. A few individual volatile organic compounds (VOCs) were detected; however, none were present at concentrations above their respective Maximum Contaminant Levels (MCLs). Seven different pesticide compounds were detected in four wells in the Santa Clara Plain principal aquifer, but none of the pesticides detected have established MCLs. The Coyote Valley and the Llagas Subbasin principal aquifers had no pesticide detections.

Recent sample median concentrations for nitrate and Total Dissolved Solids (TDS) are presented in Table 7. There is no statistically significant change for nitrate or TDS between CY 2014 and CY 2015 for all areas and aquifer zones per the Mann-Whitney Test, using a 95% confidence level. Fluctuations in sample medians are expected due to variation in which wells are tested each year, and amounts of recharge, pumping, and rainfall.

Table 7 Median Nitrate and TDS by Subbasin and Aquifer Zone (mg/L)

Parameter	Santa Clara Subbasin						Llagas Subbasin			
	Santa Clara Plain Shallow Aquifer		Santa Clara Plain Principal Aquifer		Coyote Valley		Shallow Aquifer		Principal Aquifer	
	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014
Nitrate (as NO_3)	9.2	6.4	13	13	23.8	15.2	34	49.2	28.6	20.5
TDS	498	542	400	410	380	370	412	434	371	382

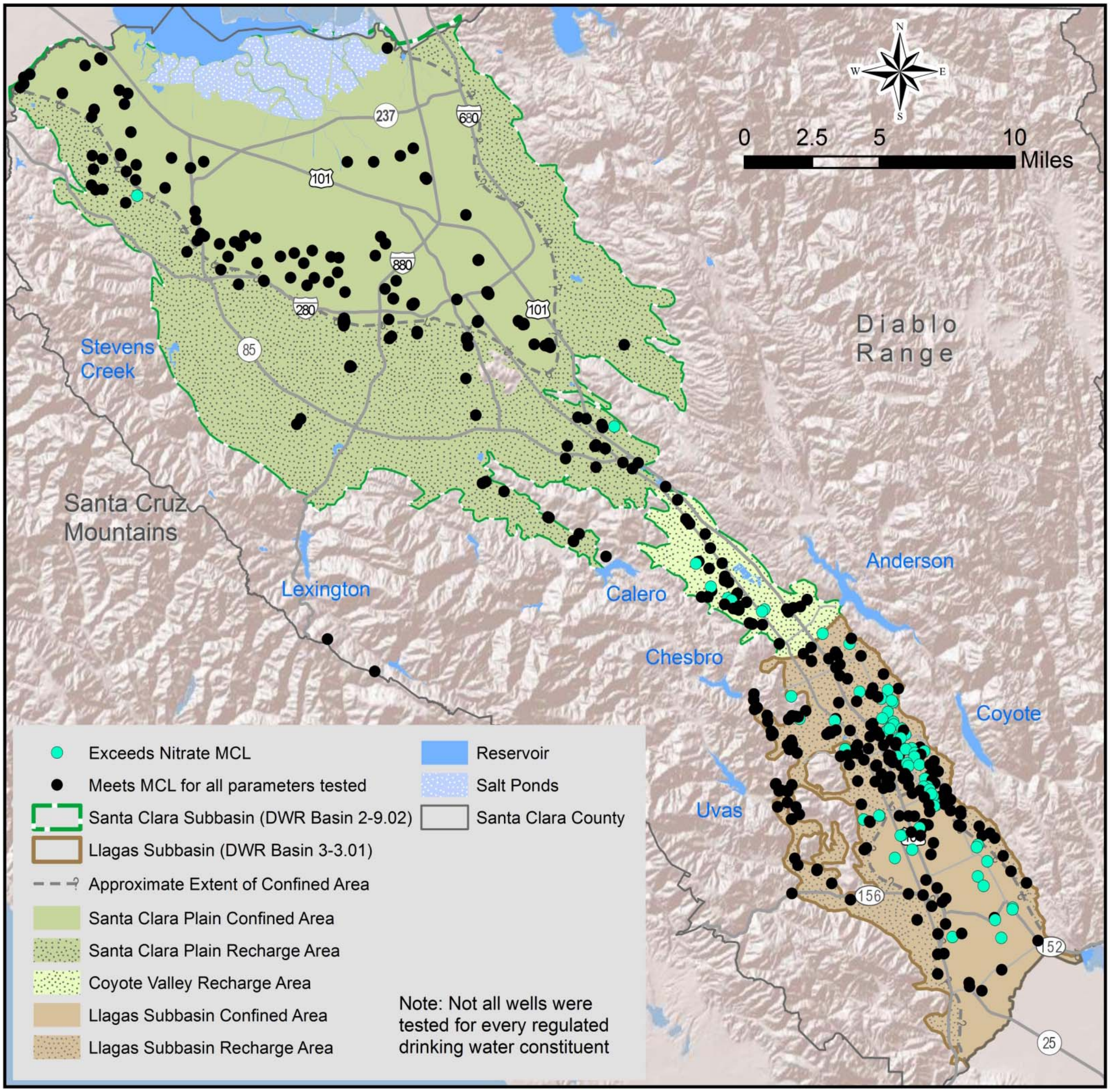
1) The shallow and principal aquifer zones are represented by wells primarily drawing water from depths less than and greater than 150 feet below ground surface, respectively.
2) Nitrate has a health-based MCL of 45 mg/L. TDS has an aesthetic-based MCL, which ranges from 500 to 1,000 mg/L (recommended and upper limit, respectively).
3) Table includes information for monitoring wells, public water supply wells, and domestic wells for which construction information is available. The set of wells sampled each year varies.
4) Median TDS in the Santa Clara Plain Shallow aquifer excludes wells within the region influenced by saltwater interaction.

Comparison to Drinking Water Standards

With the exception of nitrate, all water supply wells tested (including public water supply wells and domestic wells) met all MCLs; this drops to 84% if nitrate is included. 23% of South County water supply wells tested exceeded the nitrate MCL of 45 milligrams per liter (mg/L). Figure 21 presents the locations of wells with an MCL exceedance. Most of these detections were from private domestic wells that are not regulated by the state, while 10% (7 wells) were public water systems. Public water systems must comply with drinking water standards, which may require treatment or blending prior to customer delivery. Most domestic well owners contacted whose well water exceeds the nitrate MCL use bottled water for drinking and cooking, or reverse osmosis treatment to remove nitrate.

[13] Public water supply wells were assumed to represent the principal aquifer if no construction information was available as these are typically deep wells.

Figure 21 CY 2015 Water Supply Well Results With Regards to MCLs



While not used as a source of drinking water, some monitoring wells sampled are screened in the principal aquifer zone. Of these deep monitoring wells, only one had a detection of any constituent above its MCL (nitrate). Ten shallow aquifer zone monitoring wells were also affected by nitrate. With very few exceptions, the shallow aquifer is not directly used as a source of drinking water, although shallow groundwater recharges the principal aquifer in the long term.

Comparison to Agricultural Objectives

South County groundwater quality was evaluated against agricultural water quality objectives from the applicable Regional Water Quality Control Board Basin Plans[14] to assess its suitability for agricultural uses. Because the District has limited access to agricultural wells, water supply well data were used in this evaluation. 98 percent of all South County water supply wells met Basin Plan agricultural objectives. In Coyote Valley, all wells met the objectives except one well each for nitrate and electrical conductivity. In the Llagas Subbasin, four wells did not meet the nitrate objective.

5.2 Groundwater Quality Trends

To assess changes in water quality over time, the District evaluated statistical trends for chloride, nitrate, and TDS concentrations by groundwater management area and aquifer zone. Trend was evaluated for all wells (including water supply and monitoring wells) with at least 5 results over the last fifteen years (2001 through 2015). The results are shown in Figures 22 through 24 and summarized in Table 8, which indicates the majority of wells show a stable or decreasing trend. In general, chloride trends are stable or increasing in the Llagas Subbasin, stable in Coyote Valley, and mixed in the Santa Clara Plain. Potential causes for increasing trends in some shallow zone wells will be evaluated further. Nitrate is generally stable or decreasing throughout the county, and a cluster of wells with decreasing trends is observed in the southern portion of the Santa Clara Plain near the Coyote Valley (Figure 23). This may be the result of dilution from the managed recharge of water with low nitrate content through Coyote Creek. Though less well-defined, another cluster of wells with an upward nitrate trend is observed in the downtown area of San Jose. Only a small percentage of wells had increasing trend for TDS.

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[14] Groundwater in the Coyote Valley is compared to the limits in Table 3-6 of the San Francisco Bay Basin Water Quality Control Plan (March 2015). Groundwater in the Llagas Subbasin is compared to the upper range of the "increasing problems" range in Table 3-3 and Table 3-4 (irrigation supply) of the Water Quality Control Plan for the Central Coast Basin (March 2016).

Table 8 Chloride, Nitrate, and TDS Trends (2001 - 2015)

Groundwater Management Area	Parameter	Number of Wells Evaluated	Percent of Wells with Stable or Decreasing Trend	Number of Wells with Increasing Trend
Santa Clara Plain Shallow Aquifer	Chloride	27	67%	9
	Nitrate (as NO_3)	20	95%	1
	TDS	19	95%	1
Santa Clara Plain Principal Aquifer	Chloride	151	89%	16
	Nitrate (as NO_3)	250	88%	29
	TDS	149	96%	6
Coyote Valley	Chloride	18	100%	0
	Nitrate (as NO_3)	32	88%	4
	TDS	20	85%	3
Llagas Subbasin Shallow Aquifer	Chloride	22	55%	10
	Nitrate (as NO_3)	225	98%	5
	TDS	22	73%	6
Llagas Subbasin Principal Aquifer	Chloride	53	85%	8
	Nitrate (as NO_3)	110	95%	6
	TDS	52	98%	1
All Groundwater Management Areas	Chloride	271	84%	43
	Nitrate (as NO_3)	637	93%	45
	TDS	262	94%	17

Figure 22 **Chloride Trends (2001 - 2015)**

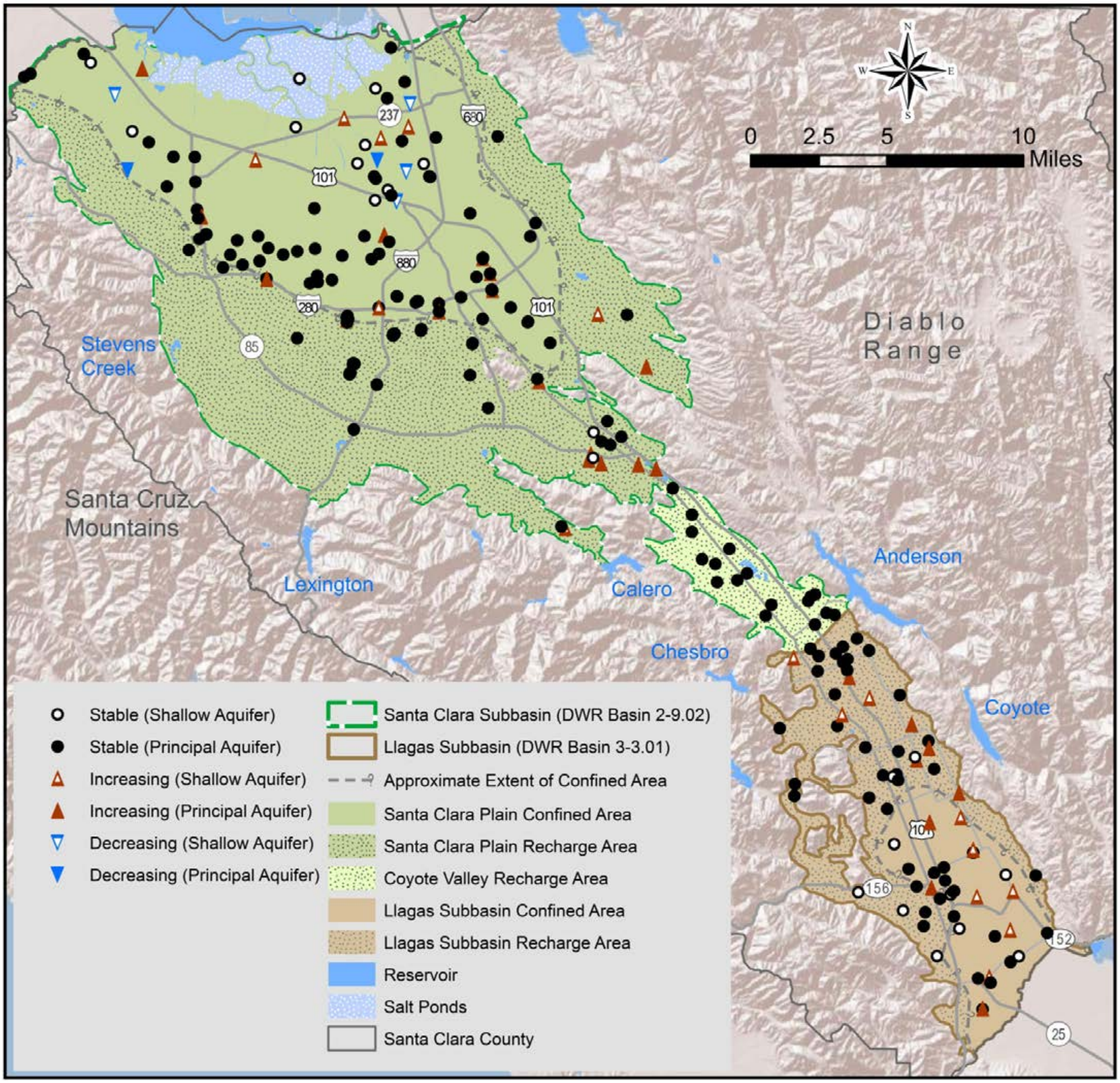


Figure 23 Nitrate Trends (2001 - 2015)

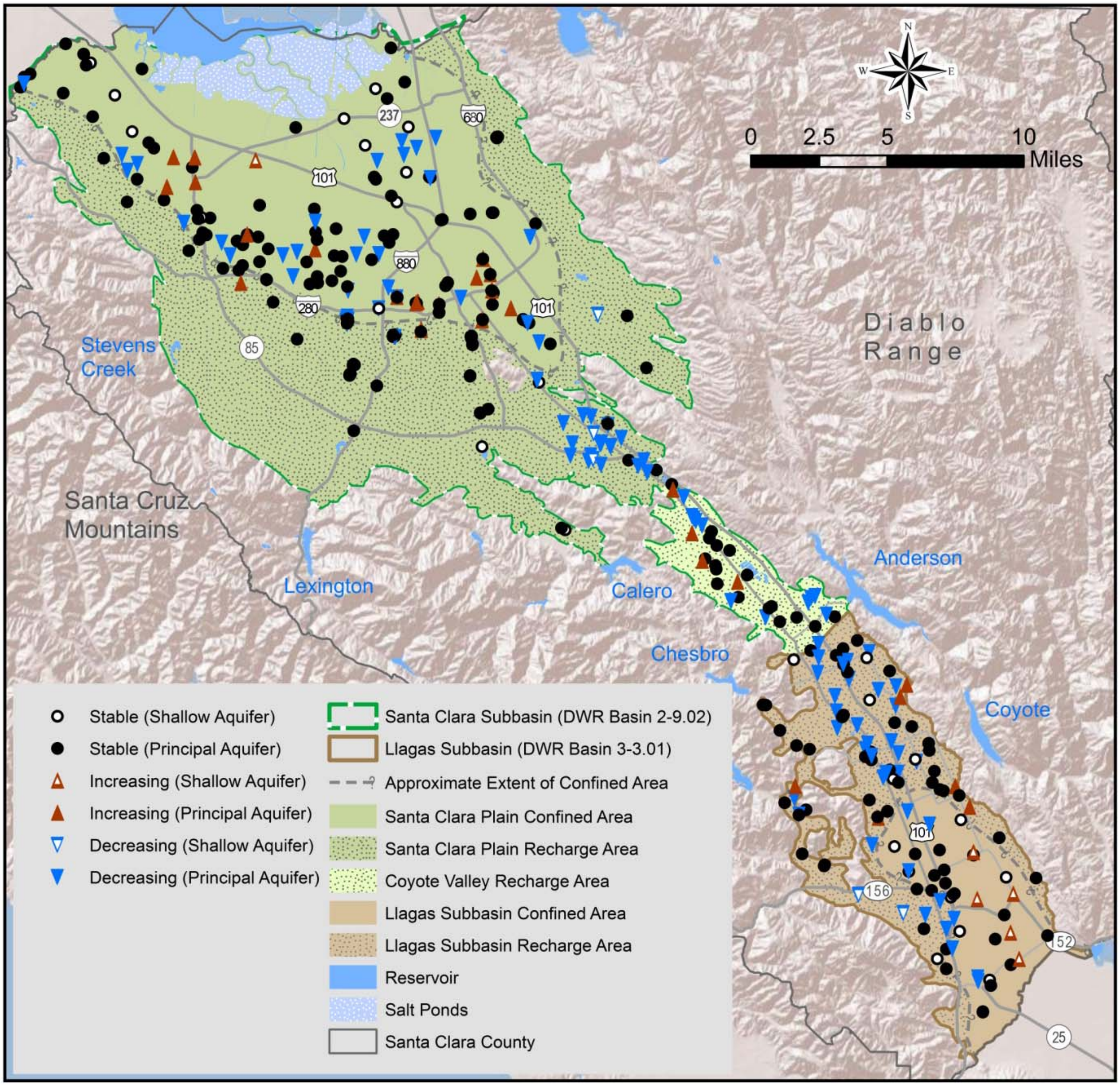
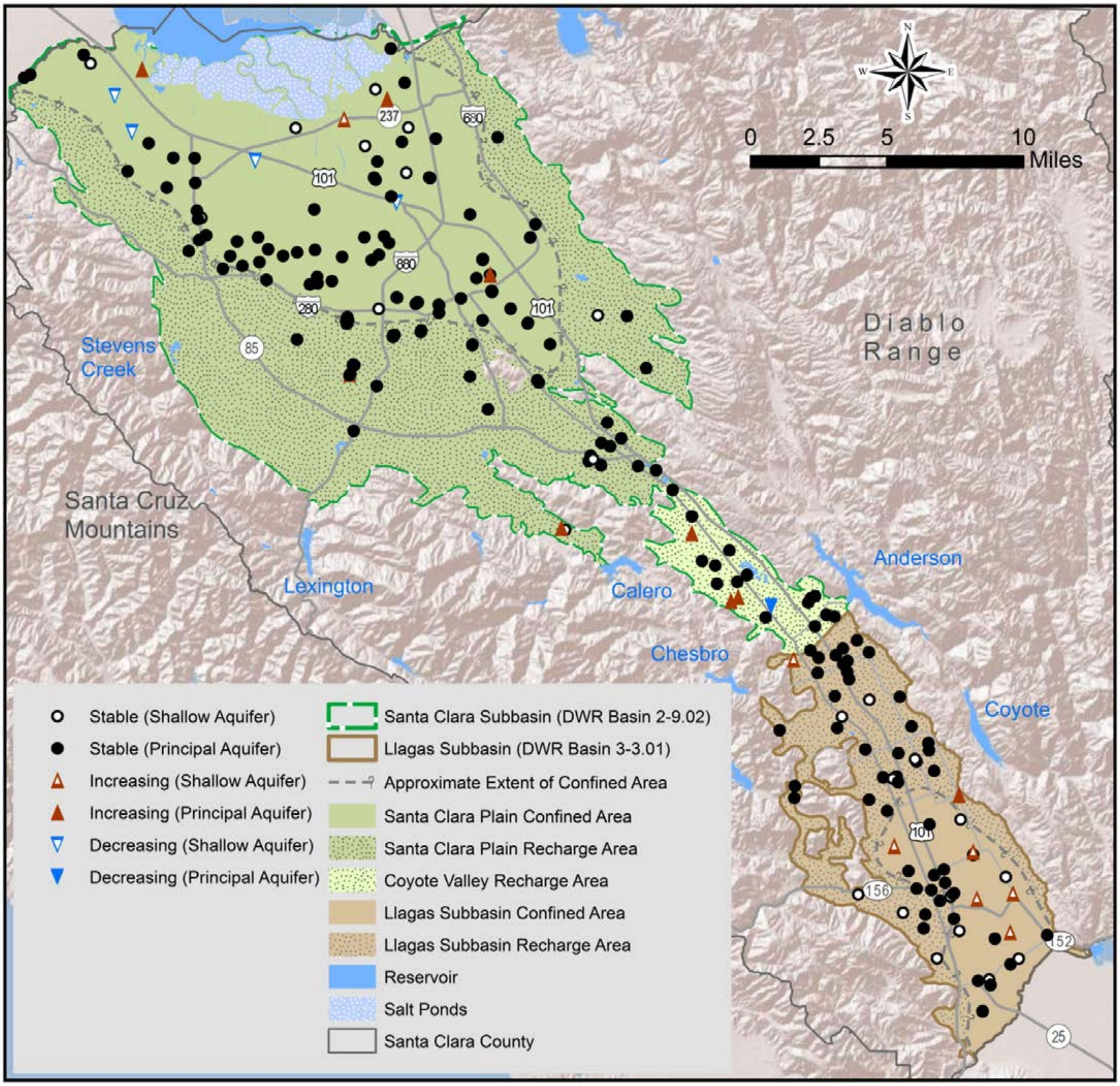


Figure 24 **Total Dissolved Solids (TDS) Trends (2001 - 2015)**



Groundwater and Salt Water Interaction

Salt water intrusion of shallow aquifers was observed historically near South San Francisco Bay and adjacent to the tidal reaches of the Guadalupe River, Coyote Creek, and other creeks in the northern portion of the Santa Clara Plain. As previously discussed, the District has implemented managed recharge and in-lieu recharge programs to minimize the risk of groundwater overdraft, land subsidence, and salt water intrusion.

Groundwater and salt water interaction in the shallow aquifer zone adjacent to southern San Francisco Bay and near tidal reaches of creeks was evaluated based on the chloride content of samples from shallow monitoring wells not used for domestic or municipal supply. The District uses a chloride concentration of 100 mg/L to indicate influence from salt water. This is a conservative indicator as the aesthetic-based secondary MCL for chloride is 250 mg/L.

As shown on Figure 25, wells in which chloride is over 100 mg/L are located in a narrow band adjacent to the former salt evaporation ponds, except in the areas adjacent to Guadalupe River and Coyote Creek. In these areas, a larger portion of the shallow aquifer is affected due to tidal incursion in these channels that occurs due to historic land subsidence. A significant increase in chloride content is observed near the levee system that defines former salt evaporation ponds. The majority of shallow wells in this area have downward trends for chloride, demonstrating that the salt water intrusion front appears to be stable or retreating.

Historically, few wells in the principal aquifer zone were found to have elevated TDS, and the chloride concentrations noted were relatively low. Salt water intrusion of the principal aquifer may occur from shallow saline groundwater via vertical conduits such as abandoned wells when the vertical hydraulic gradient is downward. The source of the elevated TDS in deeper wells in some areas has been characterized as connate water (trapped salt water from the geologic past), rather than recent saline intrusion. The District currently conducts only limited monitoring of the principal aquifer in the Baylands area because few deeper wells are available. Migration of saline shallow groundwater into the principal aquifer has been prevented due to the District's managed and in-lieu recharge programs, which maintains artesian conditions (upward vertical gradient) in the Baylands area. Tidal incursion in the bayward reaches of streams still occurs, and continues to introduce saline water to the shallow aquifer, as observed in elevated chloride concentrations in shallow aquifer wells in the Baylands area.

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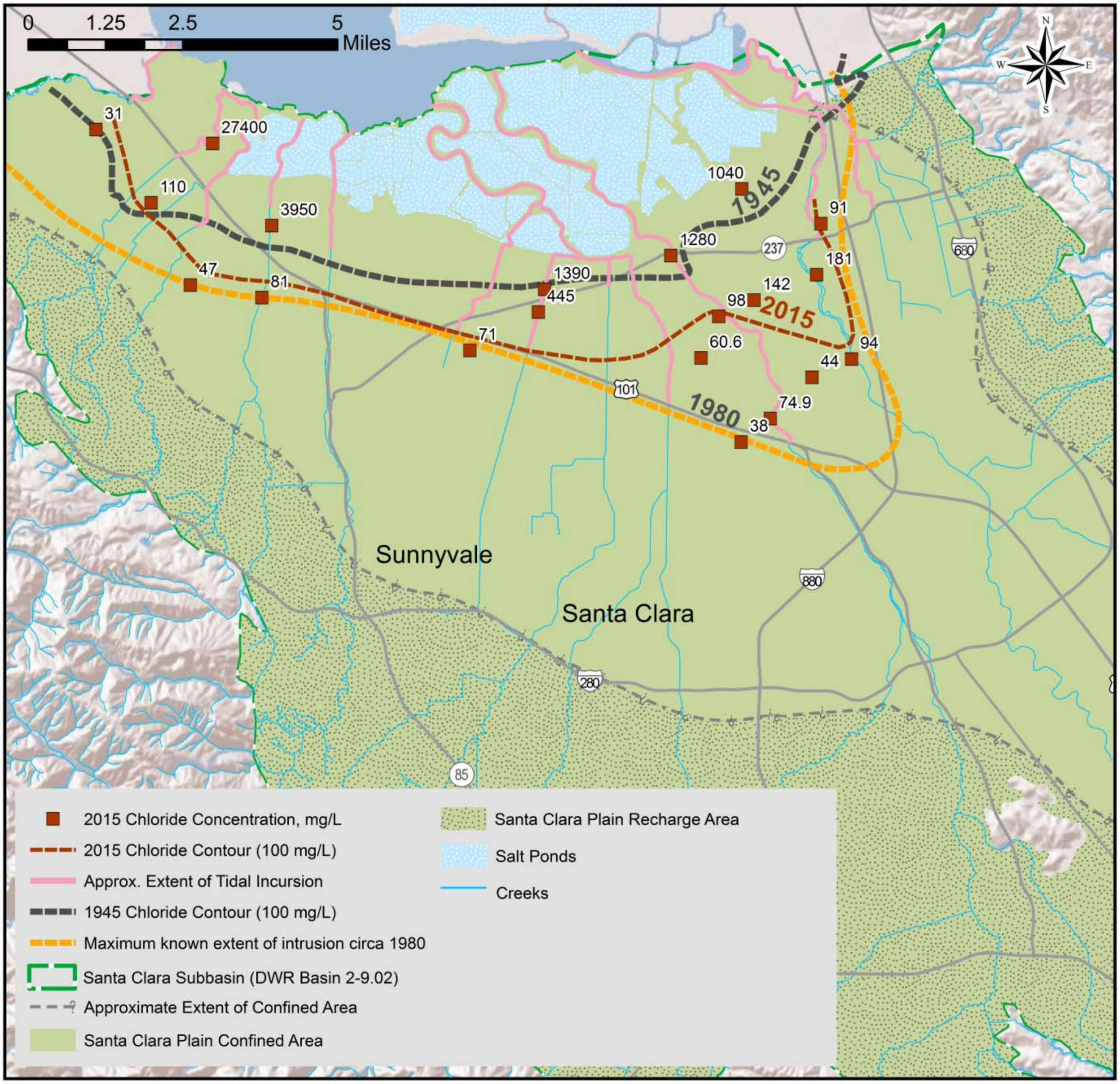
Figure 25 Groundwater and Salt Water Interaction in Shallow Aquifer



5.3 Domestic Well Water Quality

In addition to conducting regional groundwater monitoring, the District offers basic water quality testing to eligible domestic well owners within the District's groundwater charge zones. In CY 2015, the District tested 26 domestic wells in North County and 186 wells in South County. Basic water quality parameters tested include nitrate, bacteria, electrical conductivity, and hardness.

Domestic well data helps improve the District's understanding of the occurrence of common contaminants and provides important information that helps well owners understand their water quality. Although private domestic wells are not regulated by the state, the comparison to state drinking water standards provides context for results. Table 9 summarizes the results for each charge zone, and compares findings to drinking water standards.

Nitrate was detected above the MCL at 8% of North County and 26% of South County domestic wells tested. The median nitrate concentration in domestic wells in North County was 12.7 mg/L, and in South County the median was 29.3 mg/L. The 2015 median values for each groundwater subbasin were similar to the 2014 medians. Per Table 7, the CY 2015 regional median values for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, were 13, 23.8, and 28.6 mg/L, respectively.

Table 9 CY 2015 Domestic Well Testing Results

Parameter and Units	MCL[1]	Zone W-2 North County		Zone W-5 South County	
		Median	Wells above MCL[1] (%)	Median	Wells above MCL[1] (%)
Nitrate (mg/L)	45 (P)	12.7	8%	29.3	26%
Fluoride (mg/L)	2 (P)	0.10	0%	0.10	0%
Electrical Conductivity (uS/cm)	900 (S)	830	42%	645	14%
Sulfate (mg/L)	250 (S)	50.8	0%	35.8	0%
Hardness (mg/L as CaCO3)	--	384	--	271	--
		No. Wells with Bacteria Present	% Wells with Bacteria Present	No. Wells with Bacteria Present	Wells with Bacteria Present (%)
Total Coliform Bacteria	--[2]	11	42%	67	36%
E. Coli Bacteria	--[2]	1	4%	3	2%

Notes:

1) Maximum contaminant levels are established by the DDW for public water systems. (P) indicates the parameter has a health-based primary MCL and (S) indicates a secondary, aesthetic-based MCL. Hardness does not have a primary or secondary MCL but water with hardness above 180 mg/L is classified as very hard. Water quality in domestic wells is not regulated by the state.
2) Bacteria are measured as present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have E. Coli present.

Countywide, total coliform bacteria were detected in about 37% of the domestic wells tested, a slight increase over 2014 countywide detections. Coliform bacteria are naturally present in humans, animals, and the environment and do not normally cause illness, but they should not be present in drinking water. Escherichia coli (E. coli), a type of bacteria indicative of fecal contamination, were detected in about 2% of the domestic wells tested countywide.

The continued presence of nitrate above the MCL in many domestic wells highlights the need for continued efforts to reduce well owners' exposure to nitrate. The District began implementation of a multi-year rebate program for nitrate treatment systems in the fall of 2013 and continues to offer this program. This effort complements outreach and other efforts to reduce nitrate loading in coordination with the Central Coast Water Board and other basin stakeholders.

5.4 Recharge Water Quality

The District monitors surface water quality at selected in-stream and off-stream recharge facilities to characterize recharge water quality and assess how groundwater quality may be influenced by managed recharge. The source of managed recharge water at each facility varies, and may consist of imported water, local water, or a blend of the two. Monitoring is conducted in accordance with the District's Recharge Water Quality Monitoring Plan,[15] which includes sampling each recharge system every three years.

In 2015, the District monitored seven facilities in the Los Gatos and Upper Llagas recharge systems in September, and nine facilities in December (Table 10). Due to ongoing drought conditions, reservoir releases to creeks and ponds were reduced and some facilities were dry. The samples that could be collected were analyzed for major and minor ions, trace elements, and select organic compounds. Testing of organic compounds was conducted at recharge facilities located near potentially contaminating sources (e.g., industrial and automotive chemical sources or herbicide/pesticide application areas) to evaluate potential impacts from runoff during the wet sampling event in December.

Table 10 CY 2015 Recharge Water Quality Sampling Locations

Recharge System	Facilities Sampled	
	September 2015	December 2015
Los Gatos	Camden Ponds (2 locations) and Los Gatos Creek (2 locations)	Camden Ponds (2 locations), Los Gatos Creek (4 locations)
Upper Llagas	Madrone Channel (3 locations)	Madrone Channel (3 locations)

Although managed recharge water is not suitable for direct consumption before treatment or infiltration, comparing it to drinking water standards provides context for results. No parameters were detected above health-based drinking water standards in any of the recharge water samples. Volatile or semi-volatile organic compounds (including pesticides) were not detected in any samples. Table 11 and 12 provide water quality indicators for salinity, non-point source pollution, and trace metals. Results are compared against median groundwater concentrations for the corresponding groundwater subbasin area.

[15] Santa Clara Valley Water District, Recharge Water Quality Monitoring Plan, September 2012.

Table 11 Summary of Key Water Quality Indicators for All Recharge Systems Sampled in September 2015

Parameter	Units	Los Gatos System Median[1]	Upper Llagas System Median[1]	MCL	SMCL	Regional Groundwater Concentration[2]	
						Santa Clara Plain	Llagas
TDS	mg/L	340	370	-	500	400	371
Total Alkalinity (as CaCO3)	mg/L	123	94	-	-	229	192
Chloride	mg/L	67	111	-	250	46	40.7
Sulfate	mg/L	68	53	-	250	42	36
pH	pH units	8.3	8.5	-	6.6-8.5	7.4	7.7
Nitrate (as NO3)	mg/L	0.71	2.48	45	-	13	29
Aluminum	ug/L	ND	ND	1000	200	22.8	15.9
Iron	ug/L	0.05	0.05	-	300	20.7	9.1

Notes:

1) Table contains the median value for all stations sampled within the recharge system.

2) Typical groundwater concentration is the 2015 median for the principal zone of the Santa Clara Plain and Llagas Subbasin.

Table 12 Summary of Key Water Quality Indicators for All Recharge Systems Sampled in December 2015

Parameter	Units	Los Gatos System Median[1]	Upper Llagas System Median[1]	MCL	SMCL	Regional Groundwater Concentration[2]	
						Santa Clara Plain	Llagas
TDS	mg/L	347	398	-	500	400	371
Total Alkalinity (as CaCO3)	mg/L	110.5	94	-	-	229	192
Chloride	mg/L	79.5	118	-	250	46	40.7
Sulfate	mg/L	51.7	51.1	-	250	42	36
pH	pH units	7.65	NA	-	6.6-8.5	7.4	7.7
Nitrate (as NO3)	mg/L	0.96	0.80	45	-	13	29
Aluminum	ug/L	0.05	0.05	1000	200	22.8	15.9
Iron	ug/L	0.05	0.05	-	300	20.7	9.1

Notes:

1) Table contains the median value for all stations sampled within the recharge system.

2) Typical groundwater concentration is the 2015 median for the principal zone of the Santa Clara Plain and Llagas Subbasin.

5.5 Monitoring Near Recycled Water Irrigation Sites

The District partners with the four recycled water producers in the county[16] to expand recycled water use for non-potable purposes like large landscape irrigation, agriculture, and industrial uses. Tertiary treated recycled water generally has higher concentrations of salts, nutrients, disinfection byproducts, and emerging contaminants than local groundwater or treated water[17]. Contaminants may be introduced to groundwater through landscape irrigation, and previous studies near recycled water irrigation sites have noted evidence of significant recycled water contribution to shallow wells[18].

In 2011, the District completed the Recycled Water Irrigation and Groundwater (RWIG) Study[19] which included a field study at a recycled water irrigation site, the Integrated Device Technology (IDT) campus. The study did not find significant changes in groundwater quality for most constituents after recycled water irrigation. However, several constituents were detected at low levels, including perfluorochemicals (PFCs) and N-Nitrosodimethylamine (NDMA, a disinfection byproduct). The study suggested that best management practices and/or changes in recycled water treatment to remove emerging contaminants may be warranted for irrigating with recycled water in sensitive groundwater areas.

The District and South Bay Water Recycling (SBWR) have worked to improve recycled water quality for irrigation and other uses. Since March 2014, recycled water provided by SBWR has been blended with advanced treated water from the District's Silicon Valley Advanced Water Purification Center (SVAWPC), which produces up to eight million gallons of water a day using microfiltration, reverse osmosis, and ultraviolet light. The blended recycled water has improved water quality, with TDS lowered from about 750 mg/L to about 500 mg/L.

To monitor impacts to groundwater resources, the District evaluates potential groundwater quality changes near selected sites irrigated with tertiary treated recycled water. Figures 26 and 27 present monitoring wells near facilities using recycled water for irrigation. Over the past few years the District has monitored three sites where recycled water is used for irrigation, one in the Santa Clara Subbasin and two in the Llagas Subbasin. As part of recycled water expansion in the Llagas Subbasin, five new monitoring sites were added in 2014, and nine were added in December 2015 to establish baseline groundwater quality prior to recycled water use. The District also evaluates groundwater data at recycled water irrigation sites collected by SBWR and others as shown in Table 13. Statistical analysis of trends and geochemical methods are used to evaluate water quality changes.

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[16] Recycled water is produced at the Palo Alto Regional Water Quality Control Plant, San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Sunnyvale WPCP and the South County Regional Wastewater Authority.
[17] Advanced Recycled Water Treatment Feasibility Project, Black & Veatch, Kennedy/Jenks for the Santa Clara Valley Water District, August 2003. In the Llagas subbasin, nutrient content of recycled water is lower than ambient groundwater concentrations (Llagas Subbasin Salt and Nutrient Management Plan).
[18] California GAMA Program: Fate and Transport of Wastewater Indicators: Results from Ambient Groundwater and from Groundwater Directly Influenced by Wastewater, Lawrence Livermore National Laboratory and California State Water Resources Control Board, June 2006.
[19] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

Figure 26 Groundwater Monitoring Near Facilities Using Recycled Water - Santa Clara Subbasin

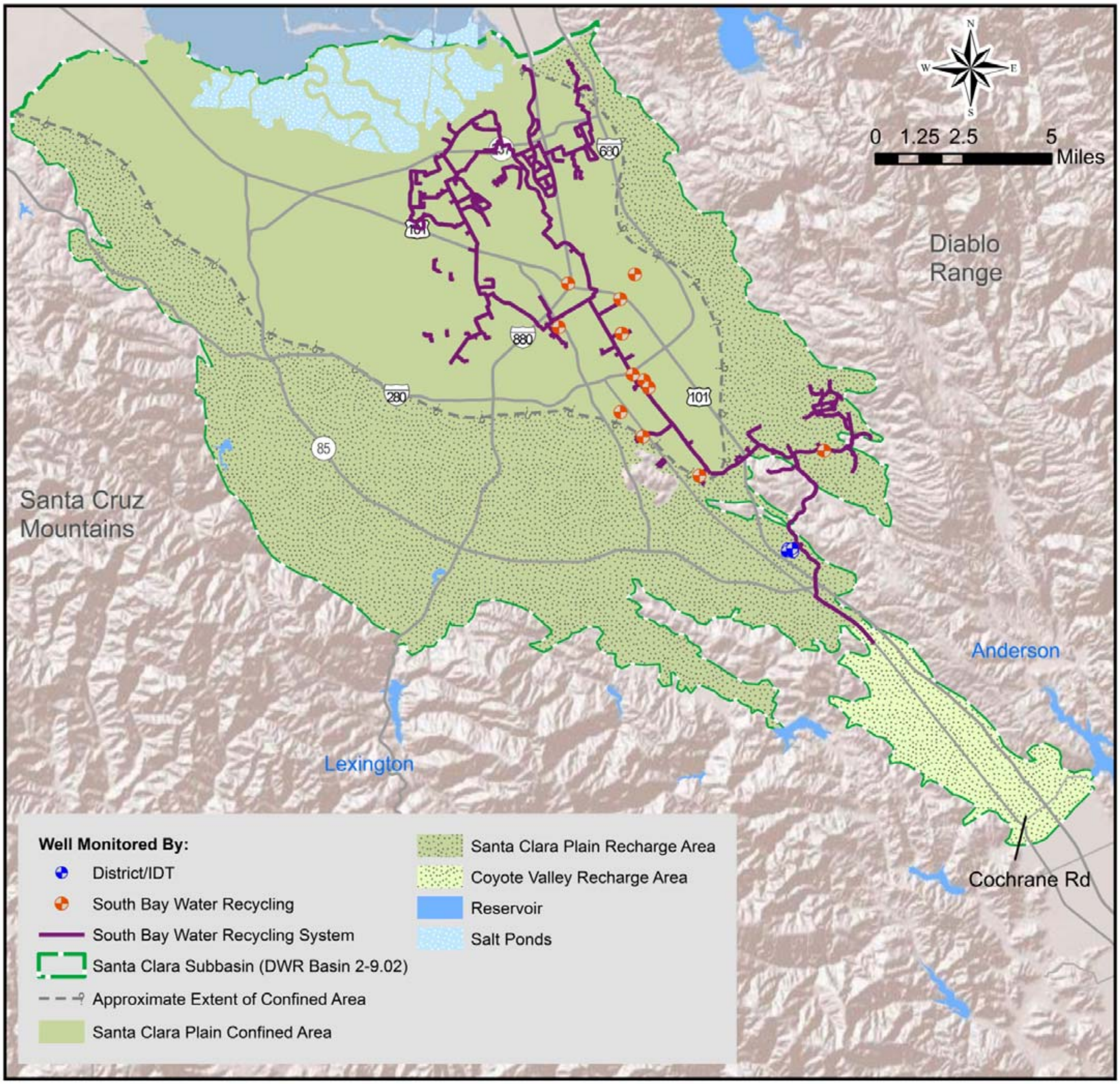

Figure 27 Groundwater Monitoring Near Facilities Using Recycled Water - Llagas Subbasin

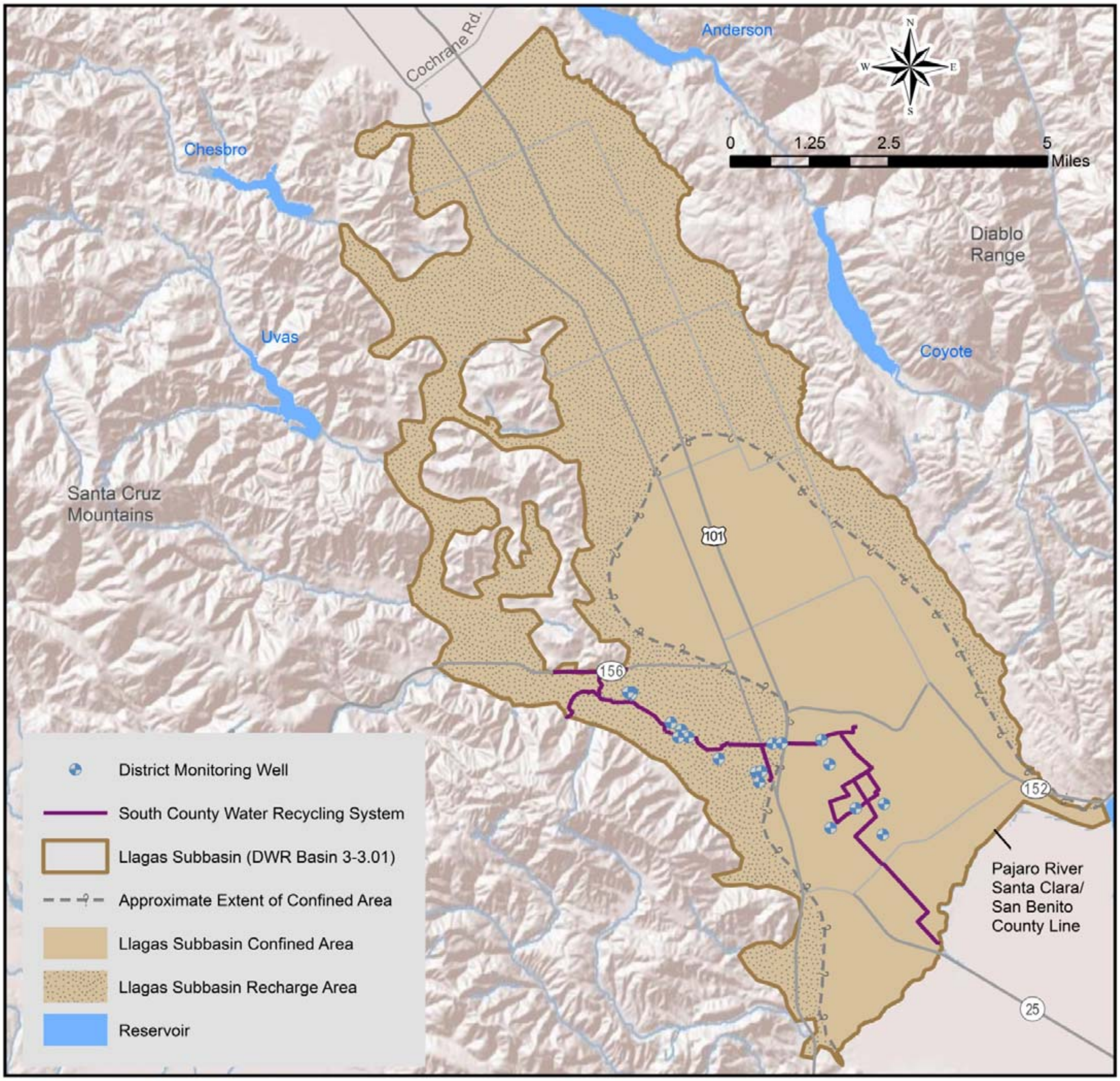

Table 13 2015 Groundwater Monitoring near Recycled Water Irrigation Sites

Subbasin	Location	Sampling Agency	Sampling Summary
Santa Clara Subbasin	Integrated Device Technology (IDT) Campus, Edenvale area of San Jose	IDT and District	• Although recycled water continues to be used for irrigation at this site, the 4 shallow wells were dry in 2015. • Recycled water delivered to this site was sampled in October 2015.
	Various Locations in San Jose	South Bay Water Recycling	• 5 shallow and 4 deep wells were monitored in February 2015 by the City of San Jose per their Groundwater Mitigation and Monitoring Plan (GMMP). • Parameters analyzed include basic salts and minerals, alkalinity and TDS.
Llagas Subbasin	Christmas Hill Park, Gilroy	District	• 3 shallow wells were sampled quarterly. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Near SCRWA Plant, Gilroy	District	• 4 shallow wells were sampled quarterly except one well that was dry in September. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Along Phase 1B Pipeline Alignment (West Gilroy)	District	• 3 shallow monitoring wells and 1 deep well were sampled quarterly. • One well remained dry in 2015. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.

As shown in Table 14, monitoring results at several sites show increasing trends for salts and low-level detections of NDMA, PFCs, and other constituents. In most cases, these contaminants were not present prior to the use of recycled water. There is some evidence that recycled water is mixing with shallow groundwater based on the geochemical analysis of groundwater. Based on these findings, it is likely that changes in shallow groundwater quality are occurring as a result of irrigation with recycled water. The District will continue to analyze data from these sites, and will evaluate if shallow groundwater quality improves with time due to improved recycled water quality resulting from the blending of tertiary treated recycled water and purified water from SVAWPC.

Table 14 Key Findings from Recycled Water Irrigation Site Monitoring

Subbasin	Location	Highlights
Santa Clara Subbasin	IDT	• Due to continued drought conditions, these wells were dry throughout 2015. District staff continues to check water levels monthly. Once water levels return to normal the District will resume sampling from these wells.
	SBWR	• The basic chemical composition for various shallow wells indicates a shift towards more saline water, primarily due to increasing chloride at the Kelley Park and Columbus Park wells. • Increasing trends continue to be observed for chloride, boron, sodium, and sulfate at many of the GMMP wells monitored in 2015.
Llagas Subbasin	Christmas Hill Park	• Groundwater quality at wells 11S03E12A002 and 11S03E12A003 have similar sodium and chloride molar ratios as recycled water and show a slight ionic shift towards recycled water. • Groundwater quality at well 11S03E01Q002 continues to be influenced by adjacent Uvas Creek, although chloride trends appear to be increasing. • Chloride and TDS trends in wells 11S03E12A002 and 11S03E12A003 are increasing. Sodium trends are decreasing in well 11S03E01Q002. • Continued detections (<1 ug/L) for PFOA and PFOS were observed in wells 11S03E12A002 and 11S03E12A003. • NDMA was detected twice in the source water and an overall decreasing trend is apparent. PFOA was detected twice in the source water.
	Irrigated Land Near SCRWA	• Groundwater quality at wells 11S04E15M002, 110S04E16F001 and 11S04E16M011 indicate similar molar ratios as recycled water. • The basic chemical composition for all wells (except deep well 11S04E16G003) indicates mixing with recycled water, in particular for chloride and sulfate. • Increasing trends were observed for most salts in well 11S04E15M002. • Decreasing trends were observed for most salts at well 11S04E16G003. • The secondary MCL for TDS was exceeded in all wells. • Trends for PFOA are decreasing in the source water and wells 110S04E16F001 and 11S04E16G003. PFOS concentrations indicate a decreasing trend at well 11S04E15M002 and 11S04E16G003. • NDMA and NDPA were detected in all four quarters in the source water, but not in any wells. Trends appear to be decreasing for NDMA in the source water.
	Irrigated Land Along Phase 1B Pipeline Alignment in Gilroy	• With the exception of well 11S04E09M001, basic chemical composition continues to resemble background groundwater chemistry. • Sampling at well 11S04E09M001 indicates high alkalinity, calcium and magnesium concentrations. • Detected compounds in well 11S04E09M001 include NDMA, PFOA, PFOS and PFBA. • An increasing trend for chloride was observed at well 11S04E07F004.

5.6 Salt and Nutrient Management Plans

The State Water Resources Control Board's 2009 Recycled Water Policy requires the development of regional Salt and Nutrient Management Plans (SNMPs). The purpose of the SNMPs is to address current and future regional salt and nutrient loading to groundwater from all sources, including recycled water and agricultural activity. The District completed two SNMPs for the Santa Clara and Llagas Subbasins by working with local stakeholders and regulators, and completing detailed salt balance analyses. The plans are posted to the District's website[20] and include: salt and nutrient source identification, loading and assimilative capacity estimates, water recycling and storm water recharge goals and objectives, implementation measures, groundwater monitoring provisions, and an anti-degradation analysis. The SNMPs were completed in 2014; the Central Coast and San Francisco Bay Water Boards will use these plans to update their basin plans and evaluate recycled water projects.

5.7 Contaminant Release Sites

There are over 400 open cases where non-fuel contaminants have been released to soil and/or groundwater in the county. These cases are overseen by the California Department of Toxic Substances Control, and the Central Coast and San Francisco Regional Water Quality Control Boards. There are also over 150 open fuel leak sites overseen by the Santa Clara County Department of Environmental Health (SCDEH) and 25 Superfund sites overseen by the United States Environmental Protection Agency (USEPA). Although there have been very limited impacts to principal drinking water aquifers from these sites, they pose a potential threat to groundwater quality.

Due to the large number of contaminated sites, District staff prioritizes which cases are closely tracked. Currently, staff monitors progress at several sites considered to be of the highest priority based on groundwater vulnerability, proximity to water supply wells or surface water, and contaminant concentration.

District staff reviews monitoring and progress reports submitted to regulatory agencies by responsible parties, as well as any regulatory orders or correspondence. Staff attends community meetings for the Olin, Middlefield-Ellis-Whisman (MEW), and Moffett Field cases, and advocates for expedited cleanup of high-threat cases through collaboration with regulatory agencies. The District also provides technical review of other contaminant release sites when requested by regulatory agencies.

Key 2015 activities related to high priority contaminant release cases are as follows:

- Olin Corporation, 425 Tennant Avenue, Morgan Hill

  Perchlorate cleanup activities by the responsible party, including the off-site extraction system, continued. As of December 2015, over 2,750 AF of water have been treated and 191 pounds of perchlorate have been removed. Sampling in preparation for the Gradient Driven Remediation (GDR) pilot study found perchlorate further east of the site than expected, which led to additional characterization activities to better define the extent of contamination. The Central Coast Water Quality Control Board issued a Monitoring and Reporting Program for the GDR pilot study in November 2015. The pilot study began in January 2016. Staff continues to participate in the Perchlorate Community Advisory Group meetings and advocate for expedited cleanup.

[20] http://www.valleywater.org/GroundwaterStudies/

- Hillview Cleaners, 1440 Big Basin Way, Saratoga

  The Hillview Cleaners site is a dry cleaner site that has released perchloroethylene (PCE) to soil and groundwater. PCE has also been detected in Saratoga Creek. District staff reviewed the December 18, 2015 Remedial Action Plan submitted to the San Francisco Regional Water Quality Control Board, which proposed offsite in-situ remediation methods. The District will continue to engage in the review of related site documents and advocate for timely and thorough cleanup.

- Moffett Field, Middlefield-Ellis-Whisman (MEW)

  This area includes four Superfund sites and more than 15 individual contaminant release sites with soil and shallow groundwater contamination by trichloroethylene (TCE) and other VOCs. District staff continues to participate in related MEW, Moffett Field Regional Advisory Board and EPA community meetings.

- United Technologies Corporation

  There were perchlorate detections up to 39 ug/L in the creek draining to Anderson Reservoir in 2015. However, perchlorate has not been detected in Anderson Reservoir above laboratory reporting limits. Between May 2014 and April 2015, 20 million gallons of groundwater were treated, removing 16.7 lbs of VOCs, 81.2 lbs perchlorate, and 0.6 lbs 1,4-dioxane. Concentrations of perchlorate, VOCs, and 1,4-dioxane in monitoring wells remained relatively constant in 2015. UTC prepared a feasibility study to eliminate discharge of groundwater containing as much as 100 mg/L perchlorate to a swale in Mixer Valley. UTC will implement a $1.1 million plan to fill the swale to prevent discharge of groundwater to surface water and to eliminate the potential for discharge to Mixer Creek. UTC has proposed reducing their reporting frequency to annually.

- Fuel Leak Cases

  District staff continues to coordinate with the SCDEH to provide technical support and review as necessary. The District received over 25 public notices of fuel leak site closures; all proposed closures appeared to be warranted and no comments were submitted.

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The evaluation of 2015 groundwater quality data against GWMP outcome measures is summarized below. Additional discussion of outcome measures, including planned action to address measures not being met, is presented in Section 7.

Groundwater Quality Outcome Measures

OM 2.1.1.e.
At least 95% of countywide water supply wells meet primary drinking water standards.

OM 2.1.1.f.
At least 90% of South County wells meet Basin Plan agricultural objectives.

OM 2.1.1.g.
At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

OM 2.1.1.e. is not met as 84% of countywide water supply wells tested in 2015 met primary drinking water standards. The exceedances were due to elevated nitrate in South County, primarily in domestic wells. If nitrate is not included, 100% of water supply wells met primary drinking water standards.

OM 2.1.1.f. is met as 98% of all South County wells met Basin Plan agricultural objectives in 2015.

OM 2.1.1.g. is partially met. This measure is not met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate as 93% of wells had stable or decreasing concentrations. This measure is met for total dissolved solids as 94% of wells had stable or decreasing concentrations.

6. OTHER GROUNDWATER MANAGEMENT ACTIVITIES

Other District groundwater management activities in CY 2015 included permitting and inspecting over 1,800 wells, reviewing relevant policy and land use proposals, and conducting public outreach on groundwater.

6.1 Well Ordinance Program

The District's well ordinance program helps ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so they prevent vertical transport of contaminants into deep drinking water aquifers. The District issued over 1,900 well permits in 2015, primarily for well destruction and monitoring well construction. The District also inspected over 1,800 wells to ensure they were properly constructed or destroyed (Table 15).

Table 15 2015 District Well Permit and Inspection Summary

Permit Type	Number Processed
Well Construction - Water Producing Wells	115
Well Construction - Monitoring Wells	398
Well Destruction	1,253
Exploratory Boring	224
Total	**1,990**
Inspection Type	**Number Inspected**
Well Construction - Water Producing Wells	87
Well Construction - Monitoring Wells	349
Well Destruction	1,173
Exploratory Boring	247
Total	**1,856**

6.2 Policy and Legislation Review

The District reviews proposed legislation and policies (both statewide and local) to ensure the county's water resources and the District's ability to manage them are protected. Related 2015 reviews focused on Sustainable Groundwater Management Act (SGMA) required regulations and cleanup legislation. This included District review and comment on DWR proposed basin boundary modification regulations, and tracking of various assembly and senate bills.

The District is subject to SGMA requirements as the Santa Clara and Llagas Subbasins are designated as medium priority and high priority, respectively. SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) for all groundwater subbasins classified as medium or high priority by June 30, 2017. A Groundwater Sustainability Plan (GSP) must be submitted for these basins by January 2020 for basins in critical overdraft, or by January 2022 for other basins. Alternatives to GSPs must be submitted by January 2017. SGMA provides broad authorities to GSAs, including the ability to meter wells, restrict pumping, implement conjunctive management projects and fund them through various fees. These authorities are in addition to any authority provided through existing statute, such as what is provided by the District Act.

Following a public hearing, the District Board adopted a resolution to become the GSA for the Santa Clara and Llagas Subbasins in May 2016. The state adopted regulations for GSPs and alternative plans in June 2016. It is assumed that the District's GWMP will require relatively minor updates to qualify as an alternative plan that meets SGMA requirements. The District plans to submit a Board-adopted alternative plan to DWR by the January 2017 statutory deadline.

6.3 Land Use Review

Threats to groundwater quality include urban runoff, industrial chemical releases, inefficient agricultural practices, and leaking underground storage tanks. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to more permeable soils and higher groundwater flow rates. Proposed development and redevelopment may also result in additional groundwater demands or impacts to water supply reliability. Land use decisions fall under the authority of the local cities and the County of Santa Clara. The District reviews land use and development plans related to District facilities and watercourses under District jurisdiction, and provides technical review for other land use proposals as requested by the local agency. Water supply assessments for new developments are also reviewed and evaluated in the context of the District's long-term water supply planning assumptions. For all reviews, the District's groundwater-related comments focus on additional analysis or action needed to ensure groundwater resources are adequately protected.

In CY 2015, the District submitted groundwater-related comments to on the following land use proposals:

- The water supply assessment section of the Draft Environmental Impact Report for the North Gilroy Neighborhood Districts Urban Service Area Amendment.
- The Final Environmental Impact Report for City Place Santa Clara.

6.4 Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. To help keep the public informed about current groundwater and water supply conditions, the District prepares monthly Water Tracker reports that are posted on the District website[21]. The District also posts monthly groundwater condition reports that contain more detailed information on groundwater pumping, recharge, and water levels.

Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. In 2015, the District celebrated Groundwater Awareness Week (March 8-14) by adopting a Board resolution commemorating the week, highlighting groundwater on the District website, and posting social media messages.

The District also maintained its status as a Groundwater Guardian Affiliate through the Groundwater Guardian Program sponsored by the Groundwater Foundation, a non-profit organization. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. District activities include the school program (which reaches thousands of students each year), implementation of groundwater

[21] www.valleywater.org/WaterTracker.aspx

protection programs, and participation in workshops such as the Small Acreage Stewardship series. At this series, District staff presents targeted information on wells and water quality protection to well owners.

The District mails the Annual Groundwater Quality Summary to all well owners in June to provide information on sampling by the District and local water suppliers. The 2015 Groundwater Quality Summary was mailed in June 2016 (Appendix A). This summary is similar to water retailer consumer confidence reports, and provides basic groundwater quality information to domestic well owners who do not typically receive water from a water retailer.

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7. CONCLUSIONS

Groundwater conditions improved in 2015 due to increased water supplies and the impressive 27% water use reduction achieved by customers served by water retailers as compared to 2013. However, groundwater levels and storage continued to be affected by the ongoing drought. Table 16 shows data for key indicators as compared to last year and the last five years (2010 to 2014). The managed recharge program was significantly increased compared to the previous year, but remained well below the 5-year average due to limited imported and local surface water. Groundwater pumping decreased significantly due to water use reduction efforts, but due to limited recharge groundwater storage decreased by 26,300 AF. The reduced groundwater pumping resulted in increased groundwater levels in many areas of the Santa Clara Plain and Coyote Valley, but levels continued to decrease in the Llagas Subbasin. Groundwater levels at all index wells were above historic lows. Groundwater quality conditions were generally similar to the previous year and the last five years, with nitrate remaining the primary groundwater protection challenge, particularly in South County.

Table 16 CY 2015 Groundwater Conditions as Compared to Other Indices

Index[1]	2015	Compared to 2014	Compared to Last 5 Years (2010 - 2014)
Managed Recharge (AF)	54,900	Up 113%	Down 35%
Groundwater Pumping (AF)	118,500	Down 30%	Down 17%
Groundwater as % of Total Water Use	42%	Down 9%	No Change
Groundwater Levels (feet)[2]			
Santa Clara Plain	49.8	Up 20%	Down 23%
Coyote Valley	259.3	Up 1%	Down 2%
Llagas Subbasin	188.9	Down 2%	Down 14%
End of Year Groundwater Storage (AF)	229,100	Down 10%	--
Land Subsidence (feet/year)[3]	0.005	Decrease	--
Groundwater Quality [4]			
Santa Clara Plain – Median TDS, mg/L	400	No Change[5]	No Change
Coyote Valley – Median TDS, mg/L	380	No Change	No Change
Llagas Subbasin – Median TDS, mg/L	371	No Change	No Change
Santa Clara Plain – Median Nitrate, mg/L	13	No Change	Decrease
Coyote Valley – Median Nitrate, mg/L	23.8	No Change	No Change
Llagas Subbasin – Median Nitrate, mg/L	28.6	No Change	No Change

1. Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain Principal Aquifer and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin Principal Aquifer.
2. Groundwater elevations represent the average of all readings at groundwater level index wells for the time period noted.
3. The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2015.
4. Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3. Data from shallow monitoring wells is excluded, including wells with high TDS due to saline intrusion.
5. Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. “No change” indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either “Increase” or “Decrease” indicates a statistically significant change for the time period indicated.

Outcome Measure Performance and Action Plan

The District's GWMP identifies several outcome measures to assess whether basin management objectives are being accomplished. The measurement of CY 2015 data against these measures is summarized in Table 17 below, along with recommended actions to address measures not being met.

Table 17 Summary of Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2015 Storage: 214,800 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2015 Storage: 400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2015 Storage: 13,900 AF **Action Plan for OM 2.1.1.a, b, and c:** In accordance with the Water Shortage Contingency Plan, the District Board of Directors called for a 30% countywide water use reduction in March 2015. In June 2016, this was adjusted to 20% in light of improved supplies.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2015.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 84% of countywide water supply wells tested in 2015 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 100% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives. **Action Plan for OM 2.1.1.e:** Implement Salt and Nutrient Management Plans to address salt loading, continue free testing program for domestic wells, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 84% of wells showing stable or decreasing concentrations. This measure is met for nitrate and total dissolved solids as stable or decreasing concentrations were observed in 93% and 94% of wells, respectively. **Action Plan for OM 2.1.1.g:** Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met
Outcome measure not met

Groundwater Outlook

Groundwater levels and storage have begun to recover with improved rainfall and increased surface water available for managed recharge in CY 2015. Groundwater storage has been critical in helping to meet the county's water supply needs during the ongoing drought. The estimated end of year storage for 2015 was below the 300,000 AF target but water levels did not exceed subsidence thresholds in related index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 30% water use reduction target (compared to 2013) in March 2015. The water use reduction target was adjusted to 20% in June 2016 due to improved water supply conditions.

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several IPR projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

Compliance with SGMA will be a major focus of District groundwater management in CY 2016. The District was deemed the exclusive Groundwater Sustainability Agency (GSA) for the Santa Clara and Llagas Subbasins on June 22, 2016 by DWR. The District's scientific basin boundary modification request for the Llagas Subbasin has been approved by DWR and will be included in a revised DWR Bulletin 118 in late 2016. The District will update the 2012 Groundwater Management Plan for submittal to DWR as an Alternative to a Groundwater Sustainability Plan under SGMA.

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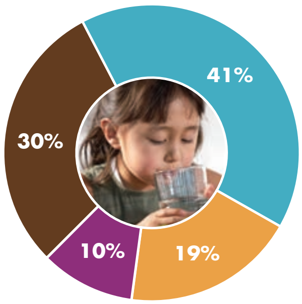
Appendix A
2015 Groundwater Quality Summary Provided to Well Owners

Santa Clara Valley Water District

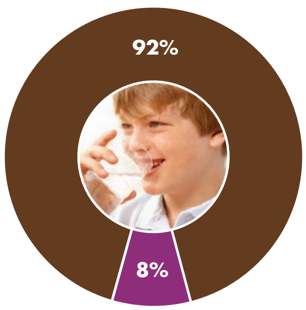
Groundwater Quality Summary Report

For Testing Performed in 2015

NORTH COUNTY WATER USE



SOUTH COUNTY WATER USE



- Groundwater
- Treated Water
- Hetch-Hetchy
- Other Local and Recycled Water

Protecting our Groundwater

Groundwater is an essential local resource, providing about half of the water used in Santa Clara County each year. In some areas, groundwater is the only source of drinking water. Protecting our groundwater helps ensure adequate supplies are available now and in the future.

The Santa Clara Valley Water District works to safeguard groundwater by:

- Replenishing groundwater with local and imported surface water.
- Reducing demands on groundwater through the delivery of treated water, water conservation and water recycling.
- Monitoring groundwater and implementing programs to protect against contamination.

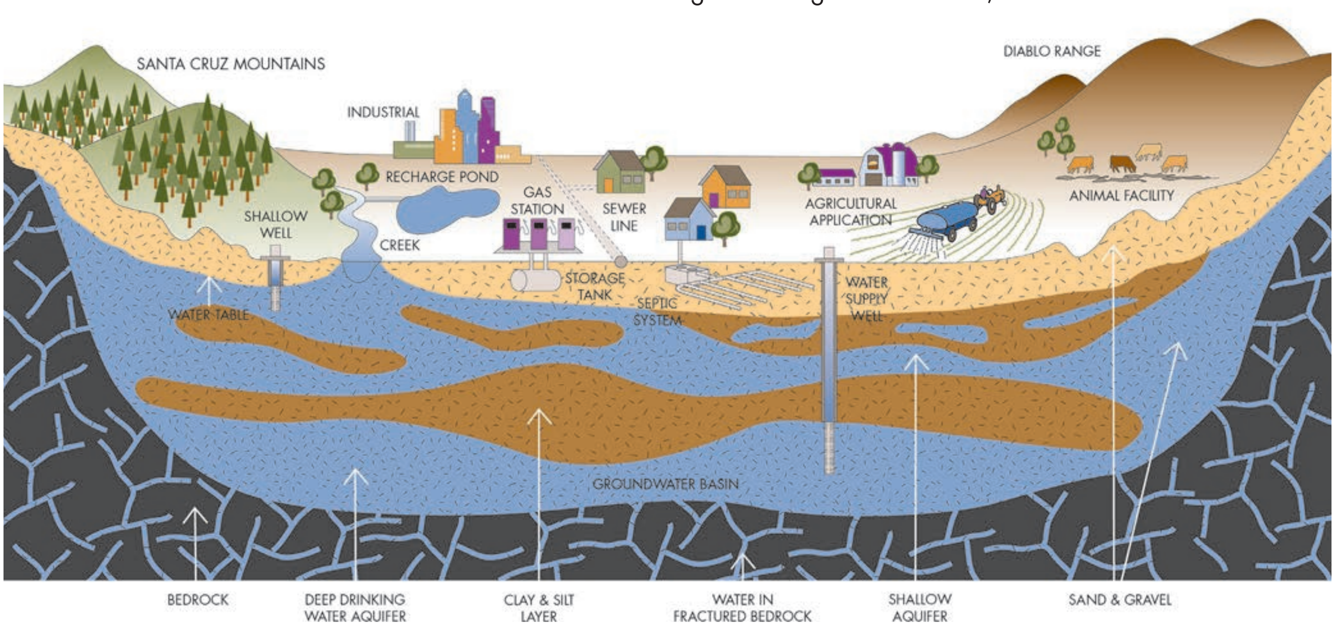
Regular well testing throughout the county indicates that groundwater quality is generally very good. Drinking water, including bottled water, may contain at least small amounts of some contaminants. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive materials, and can pick up substances from animal and human activities.

Contaminants that may be present include:

- Microbial contaminants such as viruses and bacteria that may come from sewage treatment plants, sewer lines, septic systems, agricultural operations and wildlife.
- Inorganic contaminants such as salts and metals that can be naturally occurring or result from stormwater runoff, industrial or domestic wastewater discharges, animal facilities, farming, and mining.
- Pesticides, fertilizers and herbicides that may come from agriculture, stormwater runoff and residential uses.
- Organic chemicals including synthetic and volatile organic chemicals from industrial processes, gas stations, dry cleaners, stormwater runoff, agricultural application and septic systems.
- Radioactive contaminants that are typically naturally occurring in our area.

The presence of natural or man-made contaminants does not necessarily indicate that water poses a health risk. State and federal drinking water standards identify maximum contaminant levels that relate to health risk.

Everyone has a role in protecting groundwater. Well owners should maintain their wells and septic systems, and create a zone of protection around the well where no contaminants are used or stored. See the water district's Guide for the Private Well Owner at **www.valleywater.org** for helpful tips. Residents can help by conserving water and by raising awareness that activities on the land surface can affect our largest drinking water reservoir, which is beneath our feet.



Monitoring confirms generally high groundwater quality, but South County nitrate is a concern

In 2015, the water district sampled over 230 domestic water supply wells and evaluated data from over 225 local water supplier wells. The table below summarizes groundwater quality results for North and South County (see map on back page.) 2015 results show that nearly all wells tested meet drinking water standards with the notable exception of nitrate in South County domestic wells. The water district works with regulatory and land use agencies on this ongoing groundwater protection challenge.

Water from public water systems must meet Maximum Contaminant Levels (MCLs), but domestic systems are not subject to these standards. It should be noted that not every well was tested for all parameters shown, and only parameters that were detected in water supply wells are listed. Water quality standards, including MCLs, are shown to provide context for groundwater quality results. This is a regional summary and may not reflect the water quality in your well since every property and well is unique.

Primary Drinking Water Standards - Public Health Related Standards				North County		South County		
Inorganic Contaminants	UNITS	PRIMARY MCL	PHG	MEDIAN	RANGE	MEDIAN	RANGE	Typical Sources
Aluminum	ppb	1,000	600	12.96	ND - 89	17.73	ND - 220	Erosion of natural deposits
Arsenic	ppb	10	0.004	0.06	ND - 4	0.35	ND - 5	Erosion of natural deposits; glass and electronics production waste
Asbestos	MFL	7	7	ND	ND	0.33	ND - 2.1	Erosion of natural deposits
Barium	ppb	1,000	2,000	110	ND - 290	106	53.7 - 280	Erosion of natural deposits
Chromium (total)	ppb	50	—	1.0	ND - 17	1.57	ND - 17	Erosion of natural deposits; metal plating
Chromium-6 (hexavalent)	ppb	10	0.02	1.4	ND - 6.6	1.18	ND - 9.6	Erosion of natural deposits; metal plating and industrial discharges
Fluoride (natural source)	ppm	2	1	0.10	ND - 0.89	0.05	ND - 0.59	Erosion of natural deposits
Nickel	ppb	100	12	1.1	ND - 1.71	1.02	ND - 6.89	Erosion of natural deposits; discharge from metal industries
Nitrate (as NO3)	ppm	45	45	14.6	ND - 57.1	26	ND - 139	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrate + Nitrite (as N)	ppm	10	10	3.3	4.8 - 7.7	4.75	1.1 - 10	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrite (as N)	ppb	1,000	1,000	ND	ND	216	ND - 400	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Perchlorate	ppb	6	6	ND	ND	1.32	ND - 5.6	Solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries
Selenium	ppb	50	30	ND	ND	1	ND - 2	Erosion of natural deposits
Radioactive Contaminants								
Gross Alpha	pCi/L	15	—	1.6	ND - 6	1.32	1.32 - 3.32	Erosion of natural deposits
Volatile Organic Chemicals								
1,1,1-Trichloroethane (1,1,1-TCA)	ppb	200	1,000	ND	ND - 1.8	ND	ND	Discharge from metal degreasing sites and other industrial processes
Tetrachloroethene (PCE)	ppb	5	0.06	ND	ND	ND	ND - 2.7	Discharge from industrial processes, dry cleaners, and automotive repair
Total Trihalomethanes (THMs)	ppb	80	—	0.7	0.5 - 1	NA	NA	Discharge from industrial processes, dry cleaners, and automotive repair
Xylenes (total)	ppb	1,750	1,800	ND	ND - 0.5	NA	NA	Discharge from industrial processes, dry cleaners, and automotive repair
Microbiological Contaminants[1]				**Present**	**Absent**	**Present**	**Absent**	**Typical Sources**
E. Coli Bacteria				1	25	3	185	Human and animal fecal waste
Total Coliform Bacteria				11	15	67	121	Naturally present in the environment

Notes: 1) The table shows the number of domestic wells tested that had bacteria present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have e.coli present. Domestic wells are not subject to these standards.

Terms and Definitions

Color units: A measure of color in water

Maximum Contaminant Level (MCL): The highest level of a contaminant allowed in public water systems. Primary MCLs are set as close to PHGs as is economically and technologically feasible. Secondary MCLs protect the odor,taste, and appearance of drinking water.

Median: The "middle" value of the results, with half of the values above the median and half of the values below the median.

MFL: = Million Fibers per Liter

NA: Not analyzed

ND: Not detected (at laboratory testing limit)

NTU: Nephelometric Turbidity Units

pCi/L: picoCuries per liter (a measure of radiation)

ppm: parts per million (milligrams per liter)

ppb: parts per billion (micrograms per liter)

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to human health. PHGs are set by the California EPA.

TON: Threshold Odor Number

uS/cm: microSiemens per centimeter (a measure of the dissolved inorganic salt content)

2015 Groundwater Quality Summary

Secondary Drinking Water Standards - Aesthetic Standards	UNITS	SECONDARY MCL	PHG	North County MEDIAN	North County RANGE	South County MEDIAN	South County RANGE	Typical Sources
Chloride	ppm	250	—	48	31 - 151	41	10 - 152	Runoff/leaching from natural deposits; seawater influence
Color	color units	15	—	ND	ND - 9	5	ND - 10	Naturally-occurring organic materials
Copper	ppb	1,000	300	1.22	0.74 - 1.7	3.77	0.85 - 68	Internal corrosion of household plumbing systems; erosion of natural deposits
Foaming Agents (MBAS)	ppb	500	—	ND	ND - 0.05	0.03	ND - 0.05	Non-point source pollution; discharges from industrial processes
Iron	ppb	300	—	29.9	ND - 1,100	14.99	4.4 - 1,500	Leaching from natural deposits; industrial wastes
Manganese	ppb	50	—	ND	ND - 120	0.8	ND - 120	Leaching from natural deposits; industrial wastes
Odor Threshold	TON	3	—	ND	ND - 1	ND	ND - 1	Naturally-occurring organic materials
pH	pH units	6.5 - 8.5	—	6.92	7.46 - 8	7.7	6.99 -8.5	Erosion of natural deposits; carbon dioxide emissions; rainfall
Specific Conductance	uS/cm	900	—	700	420 - 2,100	640	357 - 1,370	Substances that form ions when in water; seawater influence
Sulfate	ppm	250	—	43.4	5.1 - 239	36	5.3 - 140	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS)	ppm	500	—	410	260 - 620	376	180 - 760	Runoff/leaching from natural deposits
Turbidity	NTU	5	—	0.27	0.1 - 3.9	0.36	ND - 3.8	Soil runoff
Zinc	ppb	5,000	—	25.6	ND - 100	2.1	ND - 100	Runoff/leaching from natural deposits; industrial wastes
Other Water Quality Parameters								
Acifluorfen	ppb			ND	ND - 0.5	NA	NA	Herbicide
Alkalinity (total, as CaCO3)	ppm	—	—	230	81 - 380	190	94 - 370	Atmospheric and vadose zone carbon dioxide
Ammonia (NH3-N)	ppm			ND	ND - 0.05	NA	NA	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Boron	ppb	—	—	ND	ND - 172	106	51.9 - 4,600	Erosion of natural deposits
Bromide	ppm	—	—	0.16	ND - 1.71	0.17	ND - 0.91	Erosion of natural deposits; seawater intrusion; sea spray
Caffeine	ppb	—	—	ND	ND - 0.05	NA	NA	Wastewater
Calcium	ppm	—	—	67	26 - 110	52	5.9 - 107	Erosion of natural deposits
Carbon Dioxide	ppm	—	—	15	2 - 54	NA	NA	Atmospheric sources; dissolution of carbonate rocks
Chloromethane	ppb	—	—	ND	ND	ND	ND - 0.97	Discharge from industrial processes, dry cleaners, and automotive repair
Cobalt	ppb	—	—	ND	ND - 1	ND	ND	Leaching from natural deposits; industrial wastes
Diazinon	ppb	—	—	ND	ND - 0.1	NA	NA	Insecticide
Dichlorodifluoromethane (Freon 12)	ppb	—	—	ND	ND - 12.95	ND	ND	Discharge from industrial processes, dry cleaners, and automotive repair
Diisopropyl Ether	ppb	—	—	ND	ND - 3	ND	ND	Leaking underground storage tanks; discharge from petroleum facilities
Dimethoate	ppb	—	—	ND	ND - 0.1	NA	NA	Insecticide
Hardness (Total, as CaCO3)	ppm	—	—	300	99 - 558	270	ND - 586	Erosion of natural deposits
Lead	ppb		0.2	0.66	ND - 1.06	0.26	ND - 5.6	Erosion of natural deposits; internal corrosion of household water plumbing systems; discharges from industrial manufacturers
Lithium	ppb	—	—	5	ND - 7.5	9.60	ND - 27	Erosion of natural deposits; discharge from industrial uses
Magnesium	ppm			25	8.6 - 58	31.0	9.2 - 72	Erosion of natural deposits
Methiocarb	ppb	—	—	1.13	ND - 2	NA	NA	Pesticide
Metolachlor	ppb			ND	ND - 0.05	NA	NA	Herbicide
Metribuzin	ppb	—	—	ND	ND - 0.05	NA	NA	Herbicide
Molybdenum	ppb	—	—	ND	ND - 2.3	ND	ND - 4.4	Erosion of natural deposits
Orthophosphate	ppm	—	—	0.14	ND - 1.18	0.08	ND - 1.66	Leaching from natural deposits; agricultural runoff
p-Isopropyltoluene	ppb	—	—	ND	ND - 0.5	ND	ND	Discharge from industrial processes, dry cleaners, and automotive repair
Potassium	ppm	—	—	1.2	0.8 - 1.8	1.3	ND - 2.6	Erosion of natural deposits
Propoxur	ppb	—	—	ND	ND - 2	NA	NA	Insecticide
Radium 228	pCi/L	—	0.019	ND	ND	0.045	0.045 - 0.045	Erosion of natural deposits
Silica	ppm	—	—	26.0	24.1 - 27	26.0	18.7 - 43	Erosion of natural deposits
Sodium	ppm	—	—	30.5	16.1 - 69	26.1	14 - 197	Erosion of natural deposits
Tert-Butyl Alcohol	ppb	—	—	ND	ND	ND	ND - 4.1	Discharge from industrial processes, dry cleaners, and automotive repair
Total Organic Carbon (TOC)	ppm	—	—	ND	ND - 0.3	NA	NA	Various natural and manmade sources
Vanadium	ppb	—	—	ND	ND	ND	ND - 12	Erosion of natural deposits; discharge from industrial uses

Do I need to test my water?

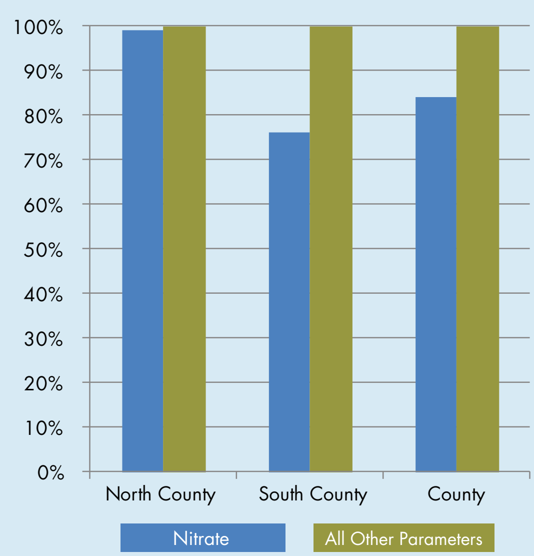
If your water comes from a public water supply, such as a city or water company, it is tested regularly to make sure that it meets state and federal drinking water standards.

If your water comes from a private well, you are responsible for making sure it is safe to drink. Although the water district monitors regional groundwater quality, every property and well has unique conditions. Some contaminants are colorless and odorless, so the first step in protecting your health is having your water tested.

The water district encourages private well owners to have their well water tested by a state-certified laboratory annually or more often if there is a change in taste, odor or appearance. If your water contains any contaminant above drinking water standards, you may want to install a treatment system or use an alternative source of water.

The water district currently offers free basic water quality testing for domestic wells and rebates of up to $500 for nitrate treatment systems — call the Groundwater Hotline at **(408) 630-2300** to find out if you are eligible.

PERCENTAGE OF WATER SUPPLY WELLS TESTED IN 2015 MEETING PRIMARY DRINKING WATER STANDARDS



Hot Topics in Water Quality

Nitrate

As shown in the chart to the left, nitrate is an ongoing groundwater protection challenge, particularly in South County. Common sources are fertilizers, septic systems and livestock waste, so nitrate is often higher in rural and agricultural areas. Nitrate can interfere with the blood's ability to transport oxygen and is of greatest concern for infants and pregnant women. Consuming high levels of nitrate may cause "blue baby syndrome;" symptoms include shortness of breath and blueness of the skin.

The water district monitors nitrate to assess hot spots and trends, recharges groundwater which helps dilute nitrate, and works with other agencies to address nitrate in groundwater. To help reduce domestic well owners' exposure to nitrate in drinking water, the water district is offering rebates of up to $500 for eligible treatment systems. Call the Groundwater Hotline at **(408) 630-2300** for more information.

Perchlorate

Perchlorate is a salt used for rocket fuel, highway flares, fireworks and other uses. Perchlorate can have adverse health effects at high levels as it can interfere with the thyroid gland, which can affect hormones that regulate metabolism and growth. Contamination from a former highway flare manufacturer in Morgan Hill was first discovered in 2000. At the urging of the water district and the community, the Central Coast Regional Water Quality Board has taken timely action to restore groundwater quality.

Due to cleanup activities and groundwater recharge, perchlorate levels have decreased dramatically. The area affected is also getting smaller, now extending from Tennant Avenue south to the San Martin Airport area. A few water supply wells still contain perchlorate above the drinking water standard and remediation by the responsible party is ongoing.

Chromium-6

Chromium-6, a suspected carcinogen, is a naturally occurring metal that is also used in several industrial processes. Geologic deposits containing chromium-6 are present in areas of Santa Clara County. California's drinking water standard of 10 parts per billion (ppb) for Chromium-6 became effective on July 1, 2014.

Lead

Lead and other metals are naturally present at low levels in groundwater due to the erosion of natural deposits. Groundwater is generally not corrosive by nature. Lead may be introduced to drinking water from faucets, plumbing fixtures and lead solder within the home and from lead service lines, if they are present. For more information, please visit **www.valleywater.org**.

You live on a groundwater basin

NORTH COUNTY
Generally extends north from Metcalf Road to San Francisco Bay

SOUTH COUNTY
extends from the Coyote Valley south to the Pajaro River

Health and education information

Drinking water, including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the U.S. Environmental Protection Agency's Safe Drinking Water Hotline (**800-426-4791**), the CA Division of Drinking Water (**www.waterboards.ca.gov/drinking_water/programs**), the CA Office of Environmental Health Hazard Assessment (**www.oehha.ca.gov/water**), or from your healthcare provider.

CONTACT US

For more information, contact the water district's Groundwater Hotline at **(408) 630-2300.** Or use our **Access Valley Water** customer request and information system at valleywater.org to find out the latest information on district projects or to submit questions, complaints or compliments directly to a district staff person.

Follow us on: /scvwd /valleywater /valleywater

To get eNews, text **VALLEYWATER** to **22828**.

Appendix B
2015 Groundwater Quality Results by Subbasin and Zone

Table B-1 Summary of 2015 Water Quality Indicator Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley			
		Shallow Zone[2]				Principal Zone[3]							
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max
Aggressive Index (Corrosivity)	INDEX	--	--	--	--	37	11.47	12	13	3	11.7	11.7	11.75
Alkalinity - Hydroxide As $CaCO_3$	mg/L	13	-5	<5	-5	18	<5	<5	<5	8	<0.5	<5	<5
Alkalinity - Bicarbonate (As $CaCO_3$)	mg/L	13	160	302	597	18	135	227.5	358	8	146	224	282
Alkalinity (Total) As $CaCO_3$	mg/L	13	160	302	597	64	81	229	380	11	133	210	282
Alkalinty - Carbonate (As $CaCO_3$)	mg/L	13	<5	<5	<5	18	-5	<5	9	8	<0.5	<5	<5
Caffeine	ug/L	--	--	--	--	5	-0.05	<0.05	0.05	--	--	--	--
Carbonate (As CO_3)	mg/L	13	<5	<5	<5	38	<5	<5	5	10	<0.5	<5	<10
Color	Color units	--	--	--	--	22	<5		9	2	<3	<3	<3
E. Coli	P/A 100 ml	3	3 Absent	0 Present		1	1	0 Present		22	22 absent	0 Present	
Foaming Agents (MBAS)	ug/L	--	--	--	--	11	<0.05	<0.5	0.05	2	<0.05		<0.05
Hardness (Total) As $CaCO_3$	mg/L	16	229	488	730	66	79	280	465	33	-10	271	459
Heterotrophic Plate Count	CFU/100mL	--	--	--	--	--	--	--	--	--	--	--	--
Hydroxide Alkalinity	mg/L	13	<5	<5	<5	38	<5	<5	5	10	<0.5	<5	<5
Langelier Index @ 60 °C	INDEX	--	--	--	--	18	0.093	0.52	0.89	2	0.42	0.42	0.42
Langelier Index at Source Temp.	INDEX	--	--	--	--	17	-0.56	-0.01	0.3	2	-0.18	-0.18	-0.18
Odor Threshold @ 60 °C	TON	--	--	--	--	38	<1	<1	1	3	<1	1	1
Oxidation Reduction Potential	mV	24	-150	-12.45	85	13	-231	24	693	6	-25		86.25
pH[10]	pH units	42	6.47	7.35	8	133	6.5	7.47	8.3	15	7.1	7.5	7.9
Source Temperature °C	C	29	17.2	20	22.7	78	16	19.1	25.3	6	18.5	19.7	24.3
Specific Conductance [10]	uS/cm	33	571	1,022	2,185	90	387	614	1,020	39	397	643	1020
Total Coliform, MPN Per 100 mL[9]	P/A 100 ml	3	3 Absent	0 Present	--	1	1	0 Present	--	22	13 absent	9 present	
Total Organic Carbon (TOC)	mg/L	--	--	--	--	9	<0.1	<0.3	0.3	--	--	--	--
Turbidity[10]	NTU	42	0.05	0.77	122	68	0.04	0.27	16	16	-0.05	0.48	3

Table B-1 Summary of 2015 Water Quality Indicator Data

Parameter	Units[1]	Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone				Principal Zone					
		n	Min	Median	Max	n	Min	Median	Max	MCL	SMCL[8]
Aggressive Index (Corrosivity)	INDEX	--	--	--	--	19	11.4	12	13	--	--
Alkalinity - Hydroxide As $CaCO_3$	mg/L	12	<5	<5	<5	19	<5	<5	<5	--	--
Alkalinity - Bicarbonate (As $CaCO_3$)	mg/L	12	121	171	344	19	94	223	368	--	--
Alkalinity (Total) As $CaCO_3$	mg/L	12	121	171	344	39	94	192	370	--	--
Alkalinty - Carbonate (As $CaCO_3$)	mg/L	12	<5	<5	<5	19	<5	<5	40	--	--
Caffeine	ug/L	--	--	--	--	--	--	--	--	--	--
Carbonate (As CO_3)	mg/L	12	<5	<5	<5	21	<5	<5	24	--	--
Color	Color units	--	--	--	--	9	<3	5	10	--	15
E. Coli	P/A 100 ml	11	9 Absent	2 present		17	17 Absent	0 present		--	--
Foaming Agents (MBAS)	ug/L	--	--	--	--	2	<0.025	0.03	0.05	--	500
Hardness (Total) As $CaCO_3$	mg/L	20	191	281	545	57	<10	252	586	--	--
Heterotrophic Plate Count	CFU/100mL	1	120	120	120	--	--	--	--		
Hydroxide Alkalinity	mg/L	12	<5	<5	<5	21	<5	<5	5	--	--
Langelier Index @ 60 °C	INDEX	--	--	--	--	18	-0.38	0.27	0.7	--	--
Langelier Index at Source Temp.	INDEX	--	--	--	--	1	<0.5	<0.5	<0.5	--	--
Odor Threshold @ 60 °C	TON	--	--	--	--	23	<1	<1	1	--	3
Oxidation Reduction Potential	mV	11	76	123	158.1	19	-44	108	165	--	--
pH[10]	pH units	22	6.75	7.29	7.9	62	6.9	7.7	8.5	--	--
Source Temperature °C	C	11	17	19.3	22.3	19	17.6	19.8	24.5	--	--
Specific Conductance [10]	uS/cm	32	411	629	1,180	136	410	619	1,240	--	900
Total Coliform, MPN Per 100 mL[9]	P/A 100 ml	11	8 Absent	3 present		17	6 Absent	11 Present		--	--
Total Organic Carbon (TOC)	mg/L	--	--	--	--	--	--	--	--	--	--
Turbidity[10]	NTU	22	0.05	0.56	6.8	50	0.07	0.37	17.5	--	5

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; CFU = Colony Forming Units; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number

2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed in more than one sample from a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.

7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.

8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.

9. A public water system collecting <40 samples/month violates the total coliform MCL if >1 sample is positive or if there is a repeat positive for fecal coliform or *E. coli*. All wells sampled in 2015 were private domestic wells.
10. Summary statistics computed from combined laboratory and field measured data.

Table B-2 Summary of 2015 Inorganic Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley			
		Shallow Zone[2]				Principal Zone[3]							
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max
Major and Minor Ions													
Bicarbonate (As HCO3)	mg/L	13	195	369	729	65	99	280	460	11	162	260	344
Bromate	ug/L	--	--	--	--	3	<5	<5	<5	--	--	--	--
Bromide	mg/L	16	0.09	0.2	0.43	29	<0.05	0.12	0.31	32	<0.05	0.12	0.91
Calcium	mg/L	13	36.4	67.7	141	64	16.2	63	113	11	7	47.1	87
Calcium As CaCO3	mg/L	13	90.9	169	337	19	40.6	134	283	8	17.6	123.5	217
Carbon Dioxide	ug/L	--	--	--	--	19	2,000	15,000	54,000	--	--	--	--
Chloride	mg/L	30	31	62.3	144	65	11	46	151	11	14	40	83
Cyanide	ug/L	--	--	--	--	42	<100	<100	<100	4	<5	<5	<100
Fluoride (Natural Source)	mg/L	16	<0.05	<0.05	0.42	70	<0.1	0.11	0.89	34	<0.05	0.09	0.2
Magnesium	mg/L	13	21.3	45.3	90	64	6.5	25	58	11	22	36.5	72
Perchlorate	ug/L	13	<4	<4	<4	74	<4	<4	<4	13	<4	<4	<4
Potassium	mg/L	13	0.7	1.2	2.5	45	0.9	1.3	4.1	10	0.7	1.28	1.7
Silica	mg/L	13	15	24	32	27	13	25	43	8	18	22	36
Sodium	mg/L	13	24	35	268	64	16	32	109	11	23	26	100
Sodium Adsorption Ratio	ratio	13	0.67	0.98	5.52	58	0.53	0.95	5.84	9	0.6	0.81	3.37
Sulfate	mg/L	16	16	27	294	66	0.8	42	120	33	1.5	41	93
Total Dissolved Solids	mg/L	13	340	498	1490	65	226	400	642	19	300	380	492
Nutrients													
Ammonia	mg/L	--	--	--	--	7	<0.05	<0.05	<0.05	--	--	--	--
Nitrate (as NO3)	mg/L	16	<0.05	9	30	235	<2	13	40	58	<2	24	71
Nitrate (as N)	mg/L	--	--	--	--	14	1.9	5	9	5	1.2	5.7	12
Nitrate + Nitrite (as N)	ug/L	--	--	--	--	19	480	3,300	7,700	7	2,910	4,950	10,000
Nitrite (as N)	ug/L	--	--	--	--	49	<200	<400	<400	19	<400	<400	400
Phospahte, Ortho	mg/L	16	<0.05	0.15	0.9	29	0.05	0.13	1.96	30	<0.05	0.08	0.46
Trace Elements													
Aluminum	ug/L	13	<20	22	80	66	<20	23	380	13	<10	12	200
Antimony	ug/L	13	<1	<1	<1	66	<1	<6	<6	12	<1	<1	<6
Arsenic	ug/L	13	<1	<1	4	66	<1	0.29	4	12	<1	0.81	2
Asbestos	MFL	--	--	--	--	29	<0.2	<0.2	<0.2	--	--	--	--
Barium	ug/L	13	42	87	280	66	<100	112.3	290	12	84	109	260
Beryllium	ug/L	13	<1	<1	<1	66	<1	<1	<1	12	<1	<1	<1
Boron	ug/L	13	78.9	136	683	27	<100	119	281	8	<50	106	139
Cadmium	ug/L	13	<0.2	<0.2	<0.2	66	<0.2	<1	<1	12	<0.2	<0.2	<1
Chromium (Total)	ug/L	13	<1	<1	5.1	68	<1	1.0	17	12	<1	1.18	17
Chromium, Hexavalent	ug/L	13	<1	<1	2.07	51	<1	1.3	8.9	12	<1	1.59	9.6
Cobalt	ug/L	13	<1	<1	<1	28	<1	<1	1	8	<1	<1	<1
Copper	ug/L	13	0.57	1.3	15.6	65	<0.5	1.3	3.4	11	<0.5	1.47	3.8
Iron	ug/L	13	<20	<20	120	102	6.71	20.7	1,300	12	<10	8.1	320
Lead	ug/L	13	<0.5	<0.5	1.06	66	<0.5	<0.5	1.5	11	<0.5	0.78	1.3
Lithium	ug/L	13	-5	7.5	17	27	<5	6.6	25	8	8.2	11.0	21
Manganese	ug/L	13	<1	5.7	380	70	<1	2.1	146	11	<1	1.8	145
Mercury	ug/L	13	<1	<1	<1	66	<1	<1	<1	10	<0.5	<1	<1
Molybdenum	ug/L	13	<1	<1	13	28	<1	<1	10	8	<1	<1	15
Nickel	ug/L	13	<1	1.6	2.6	66	<1	<1	2.1	12	<1	0.77	1.6
Selenium	ug/L	13	<5	<5	5	66	<5	<5	<5	10	<2	1.5	2
Silver	ug/L	13	<1	<1	<1	65	<1	<10	<10	11	<1	<1	<10
Thallium	ug/L	13	<1	<1	<1	66	<1	<1	<1	12	<1	<1	<1
Vanadium	ug/L	13	<3	<3	3.3	28	<3	<3	3.1	8	<3	<3	8.7
Zinc	ug/L	13	<10	<10	<10	64	<10	9.3	100	11	<10	3.3	100

Table B-2 Summary of 2015 Inorganic Constituent Data

Parameter	Units[1]	Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone				Principal Zone					
		n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Major and Minor Ions											
Bicarbonate (As HCO3)	mg/L	12	147	208.5	420	40	115	237	460	--	--
Bromate	ug/L	--	--	--	--	--	--	--	--	10	--
Bromide	mg/L	21	<0.05	0.11	0.41	38	<0.05	0.18	1.12	--	--
Calcium	mg/L	12	38	55	94	40	5.9	53.3	107	--	--
Calcium As CaCO3	mg/L	12	94	137	234	20	82.3	145	269	--	--
Carbon Dioxide	ug/L	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	12	14	47	71	41	10	40.75	152	--	250
Cyanide	ug/L	--	--	--	--	27	<5	<100	<100	150	--
Fluoride (Natural Source)	mg/L	21	<0.05	<0.05	0.24	63	<0.05	0.05	0.23	2	--
Magnesium	mg/L	12	19.7	31.1	69	40	9.2	30	66	--	--
Perchlorate	ug/L	12	<4	<4	<4	92	<4	<4	5.6	6	--
Potassium	mg/L	12	<0.5	1.05	1.5	23	<0.5	1.3	2.6	--	--
Silica	mg/L	12	20	27	39	20	20	26	43	--	--
Sodium	mg/L	12	15	23	52	41	14	28	197	--	--
Sodium Adsorption Ratio	ratio	12	0.39	0.69	1.45	40	0.44	0.75	9.87	--	--
Sulfate	mg/L	21	19	35	101	58	11	36	140	--	250
Total Dissolved Solids	mg/L	12	304	412	678	41	180	371	760	--	500
Nutrients											
Ammonia	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrate (as NO3)	mg/L	21	2.4	34	239	152	<0.05	29	124	45	--
Nitrate (as N)	mg/L	--	--	--	--	22	<0.4	4	19	10	--
Nitrate + Nitrite (as N)	ug/L	--	--	--	--	18	1,100	4,450	8,800	10,000	--
Nitrite (as N)	ug/L	--	--	--	--	61	<400	<400	<400	1,000	--
Phospahte, Ortho	mg/L	21	<0.05	0.09	0.27	37	<0.05	0.13	0.9	--	--
Trace Elements											
Aluminum	ug/L	12	<20	27	45	46	<20	16	220	1,000	200
Antimony	ug/L	12	<1	<1	<1	46	<0.5	<6	<6	6	--
Arsenic	ug/L	12	<1	<1	<1	46	<0.5	1.45	5	10	--
Asbestos	MFL	--	--	--	--	4	<0.2	<0.2	2.1	7	--
Barium	ug/L	12	12	100	440	46	<100	113	280	1,000	--
Beryllium	ug/L	12	<1	<1	<1	46	<1	<1	<1	4	--
Boron	ug/L	12	<50	106	137	23	52	106	4,600	--	--
Cadmium	ug/L	12	<0.2	<0.2	<0.2	46	<0.2	<0.5	<1	5	--
Chromium (Total)	ug/L	12	<1	1.35	5.5	46	<1	1.3	10	50	--
Chromium, Hexavalent	ug/L	11	<1	1.16	5.3	29	<1	1.1	5.7	10	--
Cobalt	ug/L	12	<1	<1	<1	20	<1	<1	<1	--	--
Copper	ug/L	12	<0.5	2.35	10.8	41	<0.5	2.7	68	--	1,000
Iron	ug/L	12	<20	<20	49.8	44	<20	9.1	1,500	--	300
Lead	ug/L	12	<0.5	<0.5	0.55	47	<0.2	0.17	5.6	--	--
Lithium	ug/L	12	<5	7.9	27	20	<5	9.6	27	--	--
Manganese	ug/L	12	<1	1.13	48.3	41	<1	1.33	120	--	50
Mercury	ug/L	11	<1	<1	<1	46	<0.05	<1	<1	2	--
Molybdenum	ug/L	12	<1	<1	1.1	20	<1	<1	4.4	--	--
Nickel	ug/L	12	<1	1.3	1.9	46	<1	1.0	6.9	100	--
Selenium	ug/L	12	<5	<5	7	46	<1	<5	<5	50	--
Silver	ug/L	12	<1	<1	<1	40	<0.2	<1	<10	--	100
Thallium	ug/L	12	<1	<1	<1	46	<0.5	<1	<1	2	--
Vanadium	ug/L	12	<3	<3	14	20	<3	<3	12	--	--
Zinc	ug/L	12	<10	<10	<10	40	<10	4.3	160	--	5,000

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; CFU = Colony Forming Units; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number

2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed in more than one sample from a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.
9. A public water system collecting <40 samples/month violates the total coliform MCL if >1 sample is positive or if there is a repeat positive for fecal coliform or *E. coli*. All wells sampled in 2015 were private domestic wells.
10. Summary statistics computed from combined laboratory and field measured data.

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
1,1,1,2-Tetrachlorethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,1,2,2-Tetrachloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	1	--
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	ug/L	--	--	--	100	ND	<10	4	ND	<10	1	ND	<2	55	ND	<10	1,200	--
1,1,2-Trichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,1-Dichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,1-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	6	--
1,1-Dichloropropene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2,3-Trichlorobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2,3-Trichloropropane	ug/L	--	--	--	19	ND	<0.00	1	ND	<0.5	1	ND	<0.5	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,2,4-Trimethylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,2-Dichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	600	--
1,2-Dichloroethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
1,2-Dichloropropane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1,3,5-Trimethylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichloropropane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
1,3-Dichloropropylene (Total)	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
1,4-Dichlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
1-1-1-Trichloroethane	ug/L	--	--	--	100	D	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	200	--
1-Phenylpropane (n-Propylbenzene)	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
2,2-Dichloropropane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
2,4-Dinitrotoluene	ug/L	--	--	--	1	ND	<0.1	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
4-Chlorotoluene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Benzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	1	--
Benzo (a) Pyrene	ug/L	--	--	--	27	ND	<0.1	3	ND	<0.1	--	--	--	19	ND	<0.1	0.2	--
Bromobenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Bromochloromethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Bromodichloromethane (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Bromoform (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Bromomethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Carbon Disulfide	ug/L	--	--	--	1	ND	<0.5	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Chloroethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Chloroform (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Chloromethane	ug/L	--	--	--	16	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	D	<0.5	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	6	--
Di(2-Ethylhexyl)Adipate	ug/L	--	--	--	27	ND	<5	3	ND	<5	--	--	--	19	ND	<5	400	--
Di(2-Ethylhexyl)Phthalate	ug/L	--	--	--	27	ND	<3	3	ND	<3	--	--	--	19	ND	<3	4	--
Dibromoacetic Acid	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Dibromochloromethane (THM)	ug/L	--	--	--	29	ND	<1	3	ND	<1	1	ND	<0.5	55	ND	<1	--	--
Dibromochloropropane (DBCP)	ug/L	--	--	--	26	ND	<0.01	3	ND	<0.01	--	--	--	19	ND	<0.01	0.2	--
Dibromomethane	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Dichloroacetic	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Dichlorodifluoromethane (Freon 12)	ug/L	--	--	--	29	D	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Dichloromethane	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
Diisopropyl Ether	ug/L	--	--	--	29	D	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
Ethylbenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	300	--
Ethylene Dibromide (EDB)	ug/L	--	--	--	26	ND	<0.02	3	ND	<0.02	--	--	--	19	ND	<0.02	0.05	--
Ethyl-tert-Butyl Ether	ug/L	--	--	--	29	ND	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
Haloacetic Acids (5) (HAA5)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<0.5	--	--	--	60	--
Hexachlorobutadiene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Isopropylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
m,p-Xylene	ug/L	--	--	--	35	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Methyl Ethyl Ketone (MEK, Butanone)	ug/L	--	--	--	20	ND	<5	2	ND	<5	--	--	--	55	ND	<5	--	--
Methyl Isobutyl Ketone	ug/L	--	--	--	20	ND	<5	2	ND	<5	--	--	--	55	ND	<5	--	--
Methyl-tert-Butyl-Ether (MTBE)	ug/L	--	--	--	103	ND	<3	4	ND	<3	1	ND	<2	55	ND	<3	13	5
Monobromoacetic Acid (MBAA)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Monochloroacetic Acid (MCAA)	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<2	--	--	--	--	--
Monochlorobenzene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	70	--
Naphthalene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
n-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
o-Xylene	ug/L	--	--	--	35	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
PCB-1016	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1221	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1232	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1242	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1248	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1254	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	0.5	--
PCB-1260	ug/L	--	--	--	6	ND	<0.5	1	ND	<0.5	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L	--	--	--	10	D	<0.5	1	ND	<0.5	1	ND	<0.5	--	--	--	--	--

Table B-3 Summary of 2015 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Polychlorinated Biphenyls (Total PCB'S)	ug/L	--	--	--	23	ND	<0.5	3	ND	<0.5	--	--	--	11	ND	<0.5	0.5	--
sec-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Styrene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	100	--
tert-Amyl-Methyl Ether	ug/L	--	--	--	29	ND	<3	3	ND	<3	1	ND	<2	55	ND	<3	--	--
tert-Butyl Alcohol	ug/L	--	--	--	15	ND	<2	3	D	<15	1	ND	<2	55	D	<2	--	--
tert-Butylbenzene	ug/L	--	--	--	29	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--
Tetrachloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	D	<0.5	5	--
Toluene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	150	--
Total Trihalomethanes	ug/L	--	--	--	3	D	0.5	--	--	--	--	--	--	--	--	--	80	--
trans-1,2-Dichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	10	--
Trichloroacetic Acid	ug/L	--	--	--	--	--	--	--	--	--	1	ND	<1	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	5	--
Trichlorofluoromethane (Freon 11)	ug/L	--	--	--	100	ND	<5	4	ND	<5	1	ND	<2.5	55	ND	<5	150	--
Vinyl Chloride	ug/L	--	--	--	100	ND	<0.5	4	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Xylenes (Total)	ug/L	--	--	--	41	D	<1	--	--	--	1	ND	<0.5	--	--	--	1,750	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of

Only wells with known construction information are presented. Unless construction is known, DDW wells are assumed to represent the principal zone, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-4 Summary of 2015 Detected Volatile Organic Compounds (VOCs)

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Chloromethane	ug/L	--	--	--	--	16	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	**0.97**	--	--
Tetrachloroethene	ug/L	--	--	--	--	100	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	**2.7**	5	--
1-1-1-Trichloroethane	ug/L	--	--	--	--	100	<0.5	<0.5	**1.8**	4	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	<0.5	200	--
Dichlorodifluoromethane	ug/L	--	--	--	--	29	<0.5	<0.5	**13**	3	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	55	<0.5	<0.5	<0.5	--	--
tert-Butyl Alcohol	ug/L	--	--	--	--	15	<2	<2	<2	3	**2.7**	**3.4**	**4.1**	1	<2	<2	<2	55	<2	<2	**3.9**	--	--
Xylenes (Total)	ug/L	--	--	--	--	41	<0.5	<0.5	**0.5**	--	--	--	--	1	<0.5	<0.5	<0.5	--	--	--	--	1,750	--
Total Trihalomethanes	ug/L	--	--	--	--	3	**0.5**	**0.7**	**1**	--	--	--	--	--	--	--	--	--	--	--	--	80	--
p-Isopropyltoluene	ug/L	--	--	--	--	10	<0.5	<0.5	**0.5**	1	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	--	--	--	--	--	--
Diisopropyl Ether	ug/L	--	--	--	--	29	<3	<3	**3**	3	<3	<3	<3	1	<2	<2	<2	55	<3	<3	<3	--	--

Notes:
Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
2,3,7,8-TCDD (Dioxin)	ug/L	NA	NA	NA	23	ND	<5	3	ND	<0.000005	NA	NA	NA	19	ND	<0.000005	0.00003	--
2,4,5-TP (Silvex)	ug/L	NA	NA	NA	27	ND	<1	6	ND	<1	NA	NA	NA	28	ND	<1	50	--
2,4-D	ug/L	NA	NA	NA	33	ND	<10	7	ND	<10	NA	NA	NA	28	ND	<10	70	--
3-Hydroxycarbofuran	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aciflurfen	ug/L	NA	NA	NA	9	**D**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alachlor	ug/L	NA	NA	NA	23	ND	<1	4	ND	<1	NA	NA	NA	29	ND	<1	2	--
Aldicarb	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aldicarb Sulfone	ug/L	NA	NA	NA	22	ND	<4	2	ND	<4	NA	NA	NA	19	ND	<4	--	--
Aldicarb Sulfoxide	ug/L	NA	NA	NA	22	ND	<3	2	ND	<3	NA	NA	NA	19	ND	<3	--	--
Aldrin	ug/L	NA	NA	NA	22	ND	<0.075	2	ND	<0.075	NA	NA	NA	11	ND	<0.075	--	--
Atrazine	ug/L	NA	NA	NA	29	ND	<0.5	5	ND	<0.5	NA	NA	NA	29	ND	<0.5	1	--
Bentazon	ug/L	NA	NA	NA	27	ND	<2	6	ND	<1	NA	NA	NA	28	ND	<2	18	--
Bromacil	ug/L	NA	NA	NA	13	ND	<10	2	ND	<10	NA	NA	NA	19	ND	<10	--	--
Butachlor	ug/L	NA	NA	NA	13	ND	<0.38	2	ND	<0.38	NA	NA	NA	19	ND	<0.38	--	--
Carbaryl	ug/L	NA	NA	NA	22	ND	<5	2	ND	<5	NA	NA	NA	19	ND	<5	--	--
Carbofuran	ug/L	NA	NA	NA	23	ND	<5	3	ND	<5	NA	NA	NA	19	ND	<5	18	--
Chlordane	ug/L	NA	NA	NA	23	ND	<0.1	3	ND	<0.1	NA	NA	NA	11	ND	<0.1	0.1	--
cis-1,3-Dichloropropene	ug/L	NA	NA	NA	22	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	0.5	--
Dalapon	ug/L	NA	NA	NA	27	ND	<10	6	ND	<10	NA	NA	NA	28	ND	<10	200	--
DCPA (Total di & mono Acid Degradates)	ug/L	NA	NA	NA	5	ND	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Diazinon	ug/L	NA	NA	NA	5	**D**	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dicamba	ug/L	NA	NA	NA	22	ND	<1.5	3	ND	<1.5	NA	NA	NA	28	ND	<1.5	--	--
Dieldrin	ug/L	NA	NA	NA	22	ND	<0.02	2	ND	<0.02	NA	NA	NA	11	ND	<0.02	--	--
Dimethoate	ug/L	NA	NA	NA	5	**D**	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dinoseb	ug/L	NA	NA	NA	27	ND	<2	6	ND	<1	NA	NA	NA	28	ND	<2	7	--

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Diquat	ug/L	NA	NA	NA	23	ND	<4	3	ND	<4	NA	NA	NA	19	ND	<4	20	--
Endothall	ug/L	NA	NA	NA	23	ND	<45	3	ND	<45	NA	NA	NA	19	ND	<45	100	--
Endrin	ug/L	NA	NA	NA	23	ND	<0.1	3	ND	<0.1	NA	NA	NA	11	ND	<0.1	2	--
Gamma-BHC (Lindane), Total	ug/L	NA	NA	NA	23	ND	<0.2	3	ND	<0.2	NA	NA	NA	11	ND	<0.2	0.2	--
Glyphosate	ug/L	NA	NA	NA	23	ND	<25	3	ND	<15	NA	NA	NA	10	ND	<25	700	--
Heptachlor	ug/L	NA	NA	NA	23	ND	<0.01	3	ND	<0.01	NA	NA	NA	11	ND	<0.01	0.01	--
Heptachlor Epoxide	ug/L	NA	NA	NA	23	ND	<0.01	3	ND	<0.01	NA	NA	NA	11	ND	<0.01	0.01	--
Hexachlorobenzene	ug/L	NA	NA	NA	23	ND	<0.5	3	ND	<0.5	NA	NA	NA	11	ND	<0.5	1	--
Hexachlorocyclopentadiene	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	11	ND	<1	50	--
Methiocarb	ug/L	NA	NA	NA	14	**D**	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Methomyl	ug/L	NA	NA	NA	22	ND	<2	2	ND	<1	NA	NA	NA	19	ND	<2	--	--
Methoxychlor	ug/L	NA	NA	NA	23	ND	<10	3	ND	<10	NA	NA	NA	11	ND	<10	30	--
Metolachlor	ug/L	NA	NA	NA	5	**D**	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Metribuzin	ug/L	NA	NA	NA	5	**D**	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Molinate	ug/L	NA	NA	NA	23	ND	<2	3	ND	<1	NA	NA	NA	19	ND	<2	20	--
Oxamyl	ug/L	NA	NA	NA	23	ND	<20	3	ND	<10	NA	NA	NA	19	ND	<20	50	--
Paraquat	ug/L	NA	NA	NA	3	ND	<20	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Pentachlorophenol	ug/L	NA	NA	NA	27	ND	<0.2	6	ND	<0.2	NA	NA	NA	28	ND	<0.2	1	--
Picloram	ug/L	NA	NA	NA	27	ND	<1	6	ND	<1	NA	NA	NA	28	ND	<1	500	--
Propachlor	ug/L	NA	NA	NA	13	ND	<0.5	2	ND	<0.5	NA	NA	NA	19	ND	<0.5	--	--
Propoxur	ug/L	NA	NA	NA	14	**D**	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Simazine	ug/L	NA	NA	NA	29	ND	<1	5	ND	<1	NA	NA	NA	29	ND	<1	4	--
Terbacil	ug/L	NA	NA	NA	4	ND	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Terbuthylazine	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	ND	<0.1	NA	NA	NA	--	--
Thiobencarb	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	19	ND	<1	70	1

Table B-5 Summary of 2015 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Toxaphene	ug/L	NA	NA	NA	23	ND	<1	3	ND	<1	NA	NA	NA	11	ND	<1	3	--
trans-1,3-Dichloropropene	ug/L	NA	NA	NA	22	ND	<0.5	3	ND	<0.5	1	ND	<0.5	55	ND	<0.5	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA

Table B-6 Summary of 2015 Detected Pesticides

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Dimethoate	ug/L	--	--	--	--	5	<0.1	<0.1	**0.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methiocarb	ug/L	--	--	--	--	14	<0.5	< 2	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propoxur	ug/L	--	--	--	--	14	<0.5	< 2	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metolachlor	ug/L	--	--	--	--	5	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diazinon	ug/L	--	--	--	--	5	<0.1	<0.1	**0.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metribuzin	ug/L	--	--	--	--	5	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aciflurfen	ug/L	--	--	--	--	9	<0.5	<0.5	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-7 Summary of 2015 Radioactive Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Gross Alpha	pCi/L	--	--	--	--	21	0.05	0.87	6	--	--	--	--	--	--	--	--	19	0.16	0.94	3.3	15	--
Gross Alpha Counting Error	pCi/L	--	--	--	--	21	1.1	2.4	3	--	--	--	--	--	--	--	--	18	0.11	0.15	1.13	--	--
Gross Alpha MDA95	pCi/L	--	--	--	--	21	1.1	2.2	3	--	--	--	--	--	--	--	--	19	0.76	1.17	2.15	--	--
Gross Beta	mrem/yr	--	--	--	--	9	<4	<4	<4	--	--	--	--	--	--	--	--	--	--	--	--	50	--
Gross Beta Counting Error	pCi/L	--	--	--	--	9	1.3	1.36	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 226	pCi/L	--	--	--	--	10	<1	<1	<1	--	--	--	--	--	--	--	--	--	--	--	--	5	--
Radium 226 Counting Error	pCi/L	--	--	--	--	7	0.11	0.16	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 226 MDA95	pCi/L	--	--	--	--	10	0.29	0.39	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 228	pCi/L	--	--	--	--	13	<1	<1	<1	--	--	--	--	--	--	--	--	1	0.045	0.045	0.045	--	--
Radium 228 Counting Error	pCi/L	--	--	--	--	2	0.3	0.3	0.3	--	--	--	--	--	--	--	--	1	0.57	0.57	0.57	--	--
Radium 228 MdaDA95	pCi/L	--	--	--	--	13	0.63	0.89	1.2	--	--	--	--	--	--	--	--	1	0.2	0.2	0.2	--	--
Uranium	pCi/L	--	--	--	--	9	<1	<1	<1	--	--	--	--	--	--	--	--	--	--	--	--	20	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells

1. pCi/l = picocuries per liter; mrem/yr = millirem per year.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Santa Clara Valley
Water District

Santa Clara Valley Water District
5750 Almaden Expressway, San Jose, CA 95118-3686
Phone: (408) 265-2600 Fax: (408) 266-0271
www.valleywater.org

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Appendix D – District Managed Recharge Facilities

The District's managed recharge program uses both runoff captured in local reservoirs and imported water delivered by the raw water conveyance system to recharge the basin through more than 390 acres of off-stream ponds and over 90 miles of local creeks.

The recharge facilities have been organized into seven systems based on watersheds, as described below. The facilities have been sorted in this way to simplify describing management of a complex and interconnected network. These systems are not independent, but rather share sources of supply and recharge the same groundwater subbasins. Water recharged in one system may be extracted many miles away.

Coyote Recharge System

This system has a recharge capacity of approximately 27,000 AF per year. The major features of this system include Anderson and Coyote Reservoirs and Coyote Creek in-stream recharge. Water sources for this system include the large Coyote Creek watershed, draining much of the west-facing slope of the Diablo Range. After leaving the hills below Anderson Reservoir, Coyote Creek flows north to San Francisco Bay, recharging both the Santa Clara Plain and Coyote Valley. Through the Santa Clara Conduit, water from this system can also be diverted south into the Llagas Water Supply Management Systems, recharging the Llagas Subbasin. In addition to local water, imported water can be delivered to the system from the Santa Clara Conduit. Imported water can be stored in Anderson Reservoir using the Anderson Force Main, and later released to Coyote Creek or diverted to the Cross Valley Pipeline for recharge elsewhere or as a water supply source for the District's surface water treatment plants. Recharge operations have been conducted in this system since 1934.

Guadalupe Recharge System

This system has a recharge capacity of approximately 25,000 AF per year, The major features of this system include Almaden, Guadalupe, and Calero Reservoirs; Guadalupe Creek, Guadalupe River, Alamitos Creek, Calero, and Ross Creek in-stream recharge; and the Los Capitancillos, Alamitos, Kooser, and Guadalupe off-stream ponds. Water can be diverted from Almaden Reservoir to Calero Reservoir via the Almaden-Calero Canal. Local water supplies are developed from the Almaden, Guadalupe, and Calero Watersheds, and imported water from the State Water Project (SWP) and Central Valley Project (CVP) can be diverted into the system via the Cross Valley Pipeline, the Almaden Valley Pipeline, and the Central Pipeline. This system recharges the Santa Clara Plain, and water can also be diverted from Calero Reservoir to the District's surface water treatment plants via the Cross Valley Pipeline. Recharge operations have been conducted in this system since 1932.

Los Gatos Recharge System

The Los Gatos recharge system has a recharge capacity of approximately 30,000 AF per year. The major features of this system include Lexington and Vasona Reservoirs, Los Gatos Creek in-stream recharge, and several off-stream systems including Page, Kirk, Oka, McGlincy, Budd, Sunnyoaks, and Camden ponds. The majority of the source water for this system is from the Los Gatos Creek Watershed in the Santa Cruz Mountains, although imported water from SWP and CVP is also delivered to the system through the District's Central Pipeline. This system recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1934.

Penitencia Recharge System

This small system is predominately served by imported water from the SWP, although local water from the Penitencia Creek Watershed also contributes to in-stream recharge in Penitencia Creek and the Overfelt and Mabury ponds. The other facilities in the system, which exclusively recharge SWP water, include the Penitencia, Piedmont, Helmsley, Capitol, and City and County Park ponds. The system has a recharge capacity of about 7,000

AF per year and recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1934.

West Side Recharge System

This system has a recharge capacity of about 15,000 AF per year. Major facilities in the system include Stevens Creek Reservoir, the McClellan off-stream ponds, and the various streams receiving water from the Stevens Creek Pipeline including Stevens, Calabazas, Regnart, Rodeo, Saratoga, Wildcat, San Tomas, and Smith Creeks. In addition to local water from the west side watersheds, imported water from SWP and CVP is delivered to the system using the Stevens Creek Pipeline. This system recharges the Santa Clara Plain. Recharge operations have been conducted in this system since 1935.

Lower Llagas Recharge System

This system has a recharge capacity of about 21,000 AF per year. Major facilities in the system include Uvas and Chesbro Reservoirs, in-stream recharge in Llagas and Uvas Creeks, the Church off-stream ponds, and the Uvas-Llagas pipeline which can divert water from Uvas Reservoir to Llagas Creek. This system is entirely dependent on local water from the Uvas and Llagas Watersheds, and recharges the Llagas Subbasin. Recharge operations have been conducted in this system since 1955.

Upper Llagas Recharge System

This system has a recharge capacity of about 19,000 AF per year. Major facilities include Llagas in-stream recharge, the Madrone Channel, and the San Pedro and Main Avenue ponds. This system recharges the Llagas Subbasin, predominately with imported CVP water.

The facilities within each District recharge system and the associated recharge capacity are shown below in Table C-2. Table C-3 provides a summary of in-stream and off-stream recharge capacity for groundwater charge zones W2 and W5.

Appendix D – District Managed Recharge Facilities

Table D-1. District Recharge Facilities

Groundwater Charge Zone	Recharge System	In-Stream Recharge (Creeks)	Annual Creek Recharge Capacity (AF)[1]	Off-Stream Recharge (Ponds)	Annual Pond Recharge Capacity (AF)[1]
Zone W2	Penitencia	Upper Penitencia Creek	2,200		
				Penitencia Ponds	3,100
				Piedmont	
				City Park Pond	
				Helmsley	
				Mabury	
				County Park Pond	
				Capitol	
				Overfelt Ponds	1,500
		Creek Total	**2,200**	**Pond Total**	**4,600**
		Recharge System Total: 6,800			
	Los Gatos	Los Gatos Creek	5,800		
				Page Ponds	5,300
				Budd Ave Ponds	5,000
				Sunnyoaks Ponds	2,200
				Camden Ponds	2,200
				McGlincy Ponds	7,700
				Oka Ponds	1,500
		Creek Total	**5,800**	**Pond Total**	**23,900**
		Recharge System Total: 29,700			
	West Side	Regnart Creek	700		
		Calabazas Creek	2,600		
		Rodeo Creek	700		
		Saratoga Creek	4,400		
		Wildcat Creek	400		
		San Tomas Creek	400		
		Smith Creek[2]	700		
		Stevens Creek	3,600		
				McClellen Ponds	1,700
		Creek Total	**13,500**	**Pond Total**	**1,700**
		Recharge System Total: 15,200			
	Guadalupe	Alamitos Creek	2,200		
		Calero Creek	900		
		Guadalupe River	4,200		
		Guadalupe Creek	2,900		
		Ross Creek	2,200		
				Alamitos Ponds	1,500
				Guadalupe Ponds	6,600

Appendix D – District Managed Recharge Facilities

Groundwater Charge Zone	Recharge System	In-Stream Recharge (Creeks)	Annual Creek Recharge Capacity (AF)[1]	Off-Stream Recharge (Ponds)	Annual Pond Recharge Capacity (AF)[1]
Zone W2				Los Cap Ponds	2,900
				Kooser Ponds	1,700
		Creek Total	**12,400**	**Pond Total**	**12,700**
		Recharge System Total: 25,100			
	Coyote	Lower Coyote Creek	1,500		
				Coyote Percolation Pond[2]	10,900
Zone W5		Upper Coyote Creek	14,600		
		Creek Total	**16,100**	**Pond Total**	**10,900**
		Recharge System Total: 27,000			
	Upper Llagas	Madrone Channel[2]	10,000		
		Tennant Creek	-		
		East Little Llagas	1,100		
				Main Avenue Ponds	2,700
				San Pedro Ponds	4,700
		Creek Total	**11,100**	**Pond Total**	**7,400**
		Recharge System Total: 18,500			
	Lower Llagas	Uvas Creek	8,100		
		Llagas Creek	5,800		
				Church Ponds	7,300
		Creek Total	**13,900**	**Pond Total**	**7,300**
		Recharge System Total: 21,200			

1. The annual recharge capacity shown assumes water is available all year and that ponds are in normal operational condition.
2. Includes in-stream spreader dam facilities.

Table D-2. District Annual Managed Recharge Capacity Summary

Groundwater Charge Zone	In-Stream Recharge (AF)	Off-Stream Recharge (AF)	Total Recharge (AF)
Zone W2	35,400	53,800	89,200
Zone W5	39,600	14,700	54,300
Total	75,000	68,500	143,500

Appendix E – Monitoring Well Details

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Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
05S02W32E002	NA	37.45815	-122.10861	218	185	198	6	7.6	MON (was AG)	ES	M	District	Other
05S02W35R001	374470N1220460W001	37.44704	-122.04603	300	190	280	4	4.15	MON (was AG)	ES	M	District	District
05S02W35R002	374471N1220460W001	37.44709	-122.04603	80	60	80	4	4.2	MON (was AG)	ES	M	District	District
05S03W35G010	NA	37.45553	-122.15508	840	108	822	44.5	44.5	MI	ES	M	Other	Other
05S03W36L012	NA	37.45086	-122.14288	NA	NA	NA	21.45	21.45	MI	ES	M	Other	Other
05S03W36P002	374502N1221430W001	37.45024	-122.14300	930	830	850	21.67	21.35	MON	PT	D	District	District
05S03W36P003	374502N1221430W002	37.45024	-122.14300	740	720	740	21.67	20.92	MON	PT	D	District	District
05S03W36P004	374502N1221430W003	37.45024	-122.14300	560	540	560	21.67	20.82	MON	PT	D	District	District
05S03W36P005	374502N1221430W004	37.45024	-122.14300	200	180	200	21.67	20.88	MON	PT	D	District	District
06S01E21M011	373938N1218748W001	37.39383	-121.87483	325	NA	NA	99.1	98.9	MON (was AG)	ES	M	District	District
06S01E22P002	NA	37.39241	-121.85085	519	NA	NA	181.1	180.7	MON (was AG)	ES	M	District	Other
06S01E27M006	NA	37.38149	-121.85641	262	NA	NA	149.9	149.3	MON (was AG)	PT	D	District	District
06S01E27P002	373772N1218499W001	37.37829	-121.85183	400	NA	NA	149.9	149.7	AG	PT	D	District	District
06S01E32M005	NA	37.36453	-121.89286	110	NA	NA	64	64.3	DO	ST	M	District	Other
06S01E35M011	NA	37.36409	-121.83976	369	180	345	129.9	130.9	MI	ES	M	District	Other
06S01W01M001	374376N1219291W001	37.43766	-121.92912	265	255	265	20.25	22.15	MI	PT	D	District	District
06S01W10N007	NA	37.41832	-121.96858	83	73	78	7	7	MON	PT	D	District	District
06S01W11B003	NA	37.43054	-121.93864	NA	NA	NA	6.9	8.4	MI	PG	M	District	Other
06S01W13C009	NA	37.41435	-121.92558	51	40	46	26	25.8	MON	PT	D	District	District
06S01W14P008	NA	37.40376	-121.94427	392	NA	NA	13	12	MON (was AG)	PG	M	District	Other
06S01W17F001	NA	37.41317	-122.00067	110	90	100	2.4	2.05	MON	PT	D	District	District
06S01W17F002	NA	37.41319	-122.00074	210	190	200	2.5	2.27	MON	PT	D	District	District
06S01W22K012	NA	37.39490	-121.95790	680	220	655	17.25	17.25	MI	ES	M	Other	Other
06S01W23L003	NA	37.39594	-121.94596	840	230	800	17.05	17.05	MI	ES	M	Other	Other
06S01W24B004	NA	37.40347	-121.91950	620	230	600	32.1	32.1	MI	ES	M	Other	Other
06S01W24B005	NA	37.40234	-121.91798	630	240	610	31.5	31.5	MI	ES	M	Other	Other
06S01W24E001	NA	37.39934	-121.92818	645	360	615	19.6	19.6	MI	ES	M	Other	Other
06S01W24E002	NA	37.39910	-121.93015	640	355	600	18.9	18.9	MI	ES	M	Other	Other
06S01W24H010	NA	37.39737	-121.91687	131	NA	NA	38	38.3	AG	ST	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S01W24H015	373962N1219156W001	37.39685	-121.91535	588	NA	NA	40	39.55	MON (was AG)	PT	D	District	District
06S01W24J037	NA	37.39471	-121.91499	53	56	61	33	32.66	MON	PT	W	District	District
06S01W26D002	NA	37.38749	-121.94790	665	295	665	21.4	21.4	MI	ES	M	Other	Other
06S01W26K001	373804N1219385W001	37.38044	-121.93855	65	55	60	32	30.92	MON	PT	D	District	District
06S01W26N017	NA	37.37648	-121.95013	770	290	740	33.25	33.25	MI	ES	M	Other	Other
06S01W26P002	373738N1219428W001	37.37376	-121.94278	460	190	430	37.1	42.38	MI	ES	M	District	District
06S01W26R001	373776N1219362W001	37.37762	-121.93619	1370	810	830	26.84	28.2	MON	PT	M	District	District
06S01W26R002	373776N1219362W002	37.37763	-121.93619	600	580	600	26.84	28.47	MON	PT	M	District	District
06S01W26R003	373776N1219362W003	37.37763	-121.93619	460	440	460	26.84	28.2	MON	PT	M	District	District
06S01W26R004	373776N1219362W004	37.37763	-121.93622	330	310	330	26.84	28.31	MON	PT	M	District	District
06S01W32H001	NA	37.37010	-121.98741	650	290	650	51.3	51.3	MI	ES	M	Other	Other
06S01W33N001	NA	37.36315	-121.98647	528	288	486	58.8	58.8	MI	ES	M	Other	Other
06S01W33R005	NA	37.35978	-121.97277	840	340	820	62.4	62.4	MI	ES	M	Other	Other
06S01W35L001	373640N1219417W001	37.36400	-121.94174	458	NA	NA	44.9	44.55	MON	ES	M	District	District
06S02W05F001	374429N1221039W001	37.44288	-122.10389	31	15	25	5	6.85	MON	ES	M	District	District
06S02W05F002	374429N1221039W002	37.44288	-122.10389	50	40	50	6.9	8.62	MON	ES	M	District	District
06S02W05F003	374429N1221039W003	37.44288	-122.10389	200	190	200	6.9	7.4	MON	PT	D	District	District
06S02W07B023	NA	37.42870	-122.12170	45	28	45	16	14.85	MON	PT	D	District	District
06S02W16L021	374069N1220886W001	37.40689	-122.08864	40	20	40	38	37.5	MON	PT	D	District	District
06S02W17R001	NA	37.40385	-122.09854	520	258	520	49.9	49.9	MI	ES	W	Other	Other
06S02W18J001	374090N1221168W001	37.40905	-122.11677	54	NA	NA	46.9	46.58	MON	PT	D	District	District
06S02W19B002	NA	37.40130	-122.12327	465	110	292	81	82	MI	ES	M	District	Other
06S02W19H002	NA	37.39701	-122.11613	268	NA	NA	81	81	MI	ES	M	Other	Other
06S02W19M001	NA	37.39513	-122.12841	569	113	569	81	81	MI	ES	M	Other	Other
06S02W20L003	NA	37.39231	-122.10578	472	NA	NA	100	100	MI	ES	M	Other	Other
06S02W20N001	NA	37.38868	-122.11230	470	NA	NA	134.8	134.8	MI	ES	M	Other	Other
06S02W21D008	NA	37.40095	-122.09507	572	232	560	58.1	58.1	MI	ES	W	Other	Other
06S02W21H003	NA	37.39629	-122.08200	565	270	555	70	70	MON	ES	W	Other	Other
06S02W22G004	373992N1220645W001	37.39920	-122.06453	285	265	285	59.8	59.4	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S02W22G005	373992N1220645W002	37.39919	-122.06454	452	414	449	60	59.5	MON	ES	M	District	District
06S02W22G006	373992N1220645W003	37.39918	-122.06455	335	303	333	60	59.5	MON	ES	M	District	District
06S02W22G009	NA	37.39631	-122.06776	680	290	510	74	74	MI	ES	W	Other	Other
06S02W22H012	373975N1220614W001	37.39752	-122.06138	360	315	359	62.1	61.6	MON	ES	M	District	District
06S02W22H014	373975N1220613W001	37.39751	-122.06135	420	374	419	62.1	61.7	MON	ES	M	District	District
06S02W22P002	NA	37.39115	-122.06925	676	200	476	75	75	MI	ES	W	Other	Other
06S02W24C008	374014N1220355W001	37.40138	-122.03548	250	NA	NA	30	32.34	MON	PT	D	District	District
06S02W24C009	NA	37.40141	-122.03540	550	NA	NA	30	31	MON	ES	M	District	District
06S02W24C010	NA	37.40143	-122.03532	1005	NA	NA	29	29.7	MON	ES	M	District	District
06S02W24J009	NA	37.39532	-122.02720	47	30	47	40	39.6	MON	PT	D	District	District
06S02W27G002	NA	37.38322	-122.06710	670	NA	NA	115	115	MI	ES	W	Other	Other
06S02W28K004	NA	37.38040	-122.08600	500	335	490	124	124	MI	ES	W	Other	Other
06S02W28N001	NA	37.37699	-122.09369	425	300	380	134.8	134.8	MI	ES	M	Other	Other
06S02W28N002	NA	37.37712	-122.09376	600	402	557	134.8	134.8	MI	ES	M	Other	Other
06S02W29F002	NA	37.38431	-122.10593	600	489	580	144	144	MI	ES	M	Other	Other
06S02W32D001	NA	37.37215	-122.11229	515	260	500	222.1	222.1	MI	ES	M	Other	Other
06S02W33B001	NA	37.37080	-122.08541	400	NA	NA	149	150.6	MI	ES	M	District	Other
06S02W34B006	373719N1220650W001	37.37186	-122.06499	NA	NA	NA	151.9	151.4	MON	ES	M	District	District
06S02W34G002	NA	37.36829	-122.06565	402	114	382	163.1	163.1	MI	ES	M	Other	Other
06S02W34J001	373646N1220626W001	37.36458	-122.06261	140	120	130	166.5	166.3	MON	PT	D	District	District
06S02W34K002	NA	37.36388	-122.06483	746	310	734	176.8	176.8	MI	ES	M	Other	Other
06S02W34N003	NA	37.36153	-122.07410	620	310	600	180.1	180.1	MI	ES	M	Other	Other
06S02W35M001	NA	37.36439	-122.05682	500	316	486	172.75	172.75	MI	ES	Q	Other	Other
06S02W36A002	NA	37.37159	-122.02396	620	208	610	98	98	MI	ES	Q	Other	Other
06S03W01B010	NA	37.44565	-122.13831	101	93.5	98.5	21	20.23	MON	PT	D	District	District
06S03W01B019	NA	37.44555	-122.13835	NA	NA	NA	17.75	17.75	MON	ES	M	Other	Other
06S03W01C012	NA	37.44435	-122.14122	900	158	882	24	24	MI	ES	M	Other	Other
06S03W02D032	NA	37.44456	-122.16712	NA	NA	NA	62.25	62.25	MI	ES	M	Other	Other
06S03W12D010	NA	37.43170	-122.14608	850	150	850	33.1	33.1	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
06S03W12R010	NA	37.42110	-122.13464	1020	NA	NA	33.1	33.1	MI	ES	M	Other	Other
06S03W13A010	NA	37.41712	-122.13629	1066	142	924	42	42	MI	ES	M	Other	Other
07S01E01G001	373531N1218116W001	37.35313	-121.81160	400	NA	NA	180.1	181.3	MON (was AG)	PT	D	District	District
07S01E02J021	NA	37.35291	-121.82435	236	NA	NA	120.1	120.1	MON	PT	D	District	District
07S01E03H001	373556N1218411W001	37.35564	-121.84112	365	NA	NA	100.1	99.5	MON	ES	M	District	District
07S01E06L001	NA	37.34977	-121.90491	398	NA	NA	65.9	66.5	MI	ES	M	District	Other
07S01E09L004	373368N1218695W001	37.33678	-121.86955	1000	820	840	84.45	85.62	MON	PT	D	District	District
07S01E09L005	373368N1218695W002	37.33678	-121.86955	640	620	640	84.43	85.58	MON	PT	D	District	District
07S01E09L006	373368N1218695W003	37.33678	-121.86955	540	520	540	84.45	85.59	MON	PT	D	District	District
07S01E09L007	373368N1218695W004	37.33678	-121.86955	425	405	425	84.44	85.58	MON	PT	D	District	District
07S01E09L008	373368N1218695W005	37.33678	-121.86955	72	62	72	84.33	85.76	MON	PT	D	District	District
07S01E16C005	NA	37.32872	-121.86815	908	526	682	107.9	109.4	MI	PT	D	District	Other
07S01E16C006	NA	37.32820	-121.86852	716	508	697	107.9	107.9	MI	ES	M	Other	Other
07S01E16C011	NA	37.32830	-121.86872	1004	551	660	99.8	101.3	MON	PT	D	District	District
07S01E19B002	373162N1219032W001	37.31617	-121.90324	85	75	85	112.23	111.93	MON	PT	D	District	District
07S01E19B003	373161N1219033W001	37.31611	-121.90326	850	770	790	112.23	112.73	MON	PT	D	District	District
07S01E19B004	373161N1219033W002	37.31611	-121.90327	455	435	455	112.23	112.23	MON	PT	D	District	District
07S01E19B005	373161N1219033W003	37.31611	-121.90326	365	345	365	112.23	112.33	MON	PT	D	District	District
07S01E19B006	373161N1219033W004	37.31611	-121.90326	240	220	240	112.23	112.43	MON	PT	D	District	District
07S01E19B007	373161N1219033W005	37.31611	-121.90326	590	570	590	112.23	112.33	MON	PT	D	District	District
07S01E24P001	NA	37.28072	-121.83691	277	164	272	162.1	160.55	MON	ES	M	District	District
07S01E26A001	NA	37.29945	-121.82544	355	117	340	141.6	141.6	MI	AM	Q	Other	Other
07S01E26B002	NA	37.30140	-121.82655	355	144	364	154	154	MI	AM	Q	Other	Other
07S01E26B010	NA	37.30001	-121.82714	400	184	400	155.6	155.6	MI	AM	M	Other	Other
07S01E26B011	NA	37.30029	-121.82891	400	204	400	135.6	135.6	MI	AM	M	Other	Other
07S01E29J007	372916N1218802W001	37.29164	-121.88019	190	NA	NA	142.1	141.85	MON	ES	M	District	District
07S01E29Q001	372906N1218812W001	37.29060	-121.88124	280	NA	NA	144	143.65	MON	ES	M	District	District
07S01E32B001	372846N1218818W001	37.28464	-121.88183	250	NA	NA	149.9	149.35	MON	ES	M	District	District
07S01E32R003	NA	37.27399	-121.87739	350	NA	NA	155.8	155.2	MON	ES	M	District	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S01E35E001	NA	37.28128	-121.83741	300	NA	NA	163.1	162.8	MON	ES	M	District	Other
07S01E35E003	NA	37.27999	-121.83616	147	46	146	165	164.06	MON	PT	D	District	District
07S01E35L004	NA	37.27995	-121.83620	228	181	226	165	164.41	MON	PT	D	District	District
07S01E36G003	372833N1218135W001	37.28335	-121.81339	134	NA	NA	160.1	159.85	MON	PT	D	District	District
07S01E36L003	NA	37.28210	-121.81878	NA	NA	NA	169.9	169.55	MON	ES	M	District	District
07S01W02A010	NA	37.35716	-121.93474	900	570	880	40.9	40.9	MI	ES	M	Other	Other
07S01W02B001	NA	37.35641	-121.94059	830	558	810	44.9	44.9	MI	ES	M	Other	Other
07S01W02G024	NA	37.35286	-121.93722	890	300	380	70	70	MI	ES	BW	Other	Other
07S01W02P003	NA	37.34649	-121.94388	840	490	820	86.6	86.6	MI	ES	M	Other	Other
07S01W03H002	NA	37.35568	-121.95374	810	540	790	63.8	63.8	MI	ES	M	Other	Other
07S01W03Q001	NA	37.34615	-121.95893	784	346	712	89.4	89.4	MI	ES	M	Other	Other
07S01W04D001	NA	37.35776	-121.98636	580	471	559	70.1	70.1	MI	ES	M	Other	Other
07S01W04E002	NA	37.35381	-121.98528	570	309	557	83.3	83.3	MI	ES	M	Other	Other
07S01W04N002	NA	37.34857	-121.98647	594	310	563	93.3	93.3	MI	ES	M	Other	Other
07S01W04Q001	NA	37.34541	-121.97369	600	306	497	90.9	90.9	MI	ES	M	Other	Other
07S01W05P002	NA	37.34706	-121.99842	770	310	760	113.3	113.3	MI	ES	M	Other	Other
07S01W06R002	NA	37.34514	-122.00776	738	328	708	133	133	MI	ES	Q	Other	Other
07S01W07N001	NA	37.33227	-122.01864	750	320	730	186	186	MI	ES	M	Other	Other
07S01W07P002	NA	37.33203	-122.01842	900	310	880	182.75	182.75	MI	ES	M	Other	Other
07S01W08B002	NA	37.34180	-121.99196	800	290	780	117.7	117.7	MI	ES	M	Other	Other
07S01W08C003	373418N1220002W001	37.34182	-122.00022	398	388	398	129	128.5	MON	ES	M	District	District
07S01W08D001	373417N1220002W001	37.34175	-122.00021	480	460	475	129	129.8	MON	ES	M	District	District
07S01W08D002	373416N1220002W001	37.34163	-122.00022	340	320	335	130	129.4	MON	ES	M	District	District
07S01W08D003	373417N1220002W002	37.34169	-122.00023	440	420	435	129	129.42	MON	PT	D	District	District
07S01W08N001	NA	37.33408	-122.00071	604	302	586	146.5	146.5	MI	ES	M	Other	Other
07S01W09G011	NA	37.33954	-121.97380	300	NA	NA	101	102.4	MON	ES	M	District	Other
07S01W09J001	NA	37.33730	-121.96922	500	202	360	99.2	99.2	MI	ES	M	Other	Other
07S01W09N001	NA	37.33422	-121.98477	710	307	370	112.4	112.4	MI	ES	M	Other	Other
07S01W09N002	NA	37.33082	-121.98437	815	300	803	129.9	129.9	MI	ES	M	Other	Other
07S01W09Q001	NA	37.33206	-121.97497	572	280	461	114.2	114.2	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S01W10D010	NA	37.34505	-121.96841	830	298	810	87.3	87.3	MI	ES	M	Other	Other
07S01W11D002	NA	37.34355	-121.94872	550	342	493	91	91	MI	ES	M	Other	Other
07S01W14P001	373177N1219435W001	37.31775	-121.94347	980	680	700	138.7	138.3	MON	PT	D	District	District
07S01W14P002	373177N1219435W002	37.31775	-121.94347	440	420	440	138.7	138.3	MON	PT	D	District	District
07S01W14P003	373177N1219435W003	37.31775	-121.94347	560	540	560	138.7	138.3	MON	PT	D	District	District
07S01W14P004	373177N1219435W004	37.31775	-121.94347	360	340	360	138.7	138.3	MON	PT	D	District	District
07S01W14P005	373177N1219435W005	37.31775	-121.94347	150	130	150	138.7	138.3	MON	PT	D	District	District
07S01W15D001	NA	37.32910	-121.96456	660	285	551	112.1	112.1	MI	ES	M	Other	Other
07S01W15E001	NA	37.32689	-121.96394	494	262	476	115	115	MI	ES	M	Other	Other
07S01W17A002	NA	37.33015	-121.98957	760	320	740	138.9	138.9	MI	ES	M	Other	Other
07S01W22E002	NA	37.30988	-121.96459	725	301	700	160.1	160.1	MI	ES	M	Other	Other
07S01W25L001	372938N1219233W001	37.29377	-121.92327	404	NA	NA	167	166.5	MON	ES	BW	District	District
07S01W27P009	NA	37.28731	-121.96003	546	300	524	194.7	196.46	MI	PT	D	District	District
07S01W28R001	NA	37.28865	-121.96880	450	NA	NA	201.1	201.6	MI	ES	M	District	Other
07S01W29C003	373008N1219975W001	37.30077	-121.99756	1000	630	650	228.37	229.84	MON	PT	D	District	District
07S01W29C004	373008N1219975W002	37.30077	-121.99756	550	530	550	228.37	229.47	MON	PT	D	District	District
07S01W29C005	373008N1219975W003	37.30077	-121.99756	380	360	380	228.37	229.47	MON	PT	D	District	District
07S01W29C006	373008N1219975W004	37.30077	-121.99756	270	250	270	228.37	229.47	MON	PT	D	District	District
07S01W30C002	373003N1220143W001	37.30029	-122.01426	620	NA	NA	250	250.2	MON	ES	M	District	District
07S01W35L013	372767N1219439W001	37.27668	-121.94390	530	510	530	216.58	215.58	MON	PT	D	District	District
07S01W35L014	372767N1219439W002	37.27668	-121.94390	410	390	410	216.58	215.68	MON	PT	D	District	District
07S01W35L015	372767N1219439W003	37.27668	-121.94390	300	280	300	216.58	215.68	MON	PT	D	District	District
07S01W35L016	372767N1219439W004	37.27668	-121.94391	180	160	180	216.58	215.68	MON	PT	D	District	District
07S01W35L017	372767N1219439W005	37.27668	-121.94390	850	630	650	216.58	215.98	MON	PT	D	District	District
07S02E06N004	NA	37.34693	-121.79943	516	225	455	187	187.5	MI	ES	M	District	Other
07S02E06Q001	NA	37.35080	-121.79625	402	NA	NA	259.8	259.3	MON	ES	M	District	District
07S02E07Q003	373346N1217908W001	37.33460	-121.79076	500	NA	NA	180.1	178.6	MON (was AG)	ES	M	District	District
07S02E18B001	NA	37.32966	-121.79412	520	NA	NA	153.9	153.4	MON	ES	M	District	Other
07S02E19B009	373127N1217917W001	37.31275	-121.79177	215	140	400	208	208.6	MON	ES	M	District	District
07S02E19C005	373161N1217973W001	37.31606	-121.79736	1030	740	760	186.4	185.7	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
07S02E19C006	373161N1217973W002	37.31606	-121.79736	630	610	630	186.4	185.7	MON	ES	M	District	District
07S02E19C007	373161N1217973W003	37.31607	-121.79736	390	370	390	186.4	185.7	MON	ES	M	District	District
07S02E19C008	373161N1217973W004	37.31606	-121.79736	290	180	200	186.4	185.6	MON	ES	M	District	District
07S02E19C009	373161N1217973W005	37.31606	-121.79736	150	130	150	186.4	185.6	MON	PT	D	District	District
07S02E21G010	373130N1217564W001	37.31305	-121.75641	358	88	353	496.1	496.6	MON	ES	M	District	District
07S02E28N003	NA	37.28829	-121.76466	38	NA	NA	433	433.1	DO	ES	M	District	Other
07S02W01E002	NA	37.35239	-122.03844	845	305	825	169	169	MI	ES	M	Other	Other
07S02W01E003	NA	37.35241	-122.03861	780	315	760	169	169	MI	ES	M	Other	Other
07S02W01G005	NA	37.35584	-122.03196	620	336	605	147	147	MI	ES	M	Other	Other
07S02W01H001	NA	37.35473	-122.02456	708	260	688	141.1	141.1	MI	ES	M	Other	Other
07S02W01L001	NA	37.35045	-122.03473	840	300	820	147	147	MI	ES	M	Other	Other
07S02W02E001	NA	37.35535	-122.05940	530	290	483	202	200	MI	ES	BM	Other	Other
07S02W02K002	NA	37.35132	-122.04875	640	280	616	187	187	MI	ES	M	Other	Other
07S02W03A002	NA	37.35651	-122.06157	692	343	672	192.9	192.9	MI	ES	M	Other	Other
07S02W03C002	NA	37.35695	-122.07007	689	255	619	192.9	192.9	MI	ES	M	Other	Other
07S02W03H001	NA	37.35285	-122.06374	630	330	610	210	210	MI	ES	M	Other	Other
07S02W03P001	NA	37.34680	-122.07065	700	210	450	219.2	218	MI	ES	M	Other	Other
07S02W11G002	NA	37.33773	-122.04768	650	NA	NA	244	244	MI	ES	BM	Other	Other
07S02W12A001	NA	37.34158	-122.02340	760	340	750	176	176	MI	ES	BM	Other	Other
07S02W25M001	NA	37.29297	-122.03841	465	NA	NA	324.1	323.8	MON	ES	M	District	Other
08S01E01J002	NA	37.26268	-121.80619	300	110	287	190	190	MON	ES	M	Other	Other
08S01E05N002	NA	37.25789	-121.89097	200	NA	NA	181.1	180.55	MON	ES	M	District	Other
08S01E07Q003	372471N1219000W001	37.24708	-121.90005	200	NA	NA	229	228.6	MON	ES	M	District	District
08S01E08H004	372522N1218787W001	37.25220	-121.87872	220	NA	NA	185	184.6	MON	ES	M	District	District
08S01E08P003	372447N1218862W001	37.24469	-121.88621	225	NA	NA	201.1	200.4	MON	ES	M	District	District
08S01E08R001	372457N1218802W001	37.24484	-121.87780	255	18	202	200.1	199.25	MON	PT	D	District	District
08S01E09N010	NA	37.24521	-121.87333	23	8	23	191.6	191.3	MON	ES	M	District	District
08S01E10F004	NA	37.25099	-121.84932	NA	NA	NA	164	163.8	MON	ES	M	District	Other
08S01E10J002	NA	37.25098	-121.84071	191	NA	NA	162.1	161.75	MON	PT	D	District	Other
08S01E11N001	372470N1218400W001	37.24703	-121.83998	157	NA	NA	161.1	160.65	MON	ES	M	District	District

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
08S01E12D010	NA	37.25824	-121.81934	275	102	266	179	179	MI	ES	M	Other	Other
08S01E12P001	NA	37.24746	-121.81309	260	80	260	183	183	MI	ES	M	Other	Other
08S01E13C003	NA	37.24077	-121.81422	200	95	190	180	180	MI	ES	M	Other	Other
08S01E13H010	NA	37.23880	-121.80410	275	NA	NA	188	188	MI	ES	M	Other	Other
08S01E15C007	372421N1218495W001	37.24215	-121.84950	435	NA	NA	164	163.7	MON	PT	D	District	District
08S01E25N003	372016N1218171W001	37.20264	-121.81966	90	21	60	344	345.57	MON	PT	D	District	District
08S01E27C002	NA	37.21358	-121.85178	70	NA	NA	273	273	DO	ES	M	District	Other
08S01W03K013	372624N1219572W001	37.26239	-121.95721	94	NA	NA	248	247.8	MON	ES	M	District	District
08S01W05K004	NA	37.26286	-121.99359	291	NA	NA	327.1	327.6	AG	ES	M	District	Other
08S01W10F002	NA	37.25279	-121.95866	458	98	245	280.8	282	AG	ES	M	District	Other
08S02E06M010	NA	37.26191	-121.80075	240	100	240	192	192	MI	ES	M	Other	Other
08S02E06R008	NA	37.25905	-121.79007	380	160	360	204	204	MI	ES	M	Other	Other
08S02E07A012	NA	37.25754	-121.78948	380	160	360	204	204	MI	AM	M	Other	Other
08S02E07A013	NA	37.25833	-121.78979	380	160	360	204	204	MI	AM	M	Other	Other
08S02E07A014	NA	37.25712	-121.78725	45	25	45	202.6	202	MON	ES	M	District	Other
08S02E07A015	NA	37.25617	-121.78762	45	25	45	204.5	203.9	MON	ES	M	District	Other
08S02E08D011	NA	37.25594	-121.78462	45	25	45	200.98	200.48	MON	ES	M	District	Other
08S02E08D012	NA	37.25736	-121.78489	45	25	45	201.81	201.46	MON	ES	M	District	Other
08S02E08M007	NA	37.24957	-121.78572	296	82	270	200	200	MI	ES	M	Other	Other
08S02E08Q001	NA	37.24696	-121.77320	320	165	300	207	207	MI	ES	M	Other	Other
08S02E08Q002	NA	37.25076	-121.78062	245	105	230	208	208	MI	ES	M	Other	Other
08S02E16K001	372341N1217571W001	37.23407	-121.75715	223	192	212	233	234.5	MON	PT	D	District	District
08S02E16P002	NA	37.23277	-121.76306	286	150	276	232	232	MI	ES	M	Other	Other
08S02E17G011	NA	37.23909	-121.77568	265	100	245	210	210	MI	ES	M	Other	Other
08S02E17J010	NA	37.23597	-121.76917	254	114	244	190	190	MI	ES	M	Other	Other
08S02E18D010	NA	37.24135	-121.80083	234	89	233	190	190	MI	ES	M	Other	Other
08S02E18E010	NA	37.23936	-121.79920	195	75	120	190	190	MI	ES	M	Other	Other
08S02E18E011	NA	37.23835	-121.80208	187	85	187	190	190	MI	ES	M	Other	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
08S02E18F016	372385N1217981W001	37.23853	-121.79814	179	147	177	191.5	191.15	MON	ES	M	District	District
08S02E18G010	372396N1217939W001	37.23959	-121.79389	178	138	178	195.4	197.3	MON	PT	D	District	District
08S02E18K010	NA	37.23640	-121.79381	200	70	180	190	190	MI	ES	M	Other	Other
08S02E18L001	372361N1217940W001	37.23609	-121.79402	200	NA	NA	190.9	192.9	AG	ES	BW	District	District
08S02E20F001	NA	37.22474	-121.77850	250	NA	NA	210	211.7	MI	ES	M	District	Other
08S02E20F002	NA	37.22381	-121.77831	170	NA	NA	210	212	MI	ES	M	District	Other
08S02E22E002	372237N1217459W001	37.22367	-121.74590	110	75	95	237.38	239.52	MON	PT	D	District	District
08S02E26M001	NA	37.20727	-121.73030	270	90	250	263	263	MI	PT	M	Other	Other
08S02E27H002	NA	37.20979	-121.73288	270	90	250	259	259	MI	PT	M	Other	Other
08S02E27J001	NA	37.20852	-121.73163	270	90	250	262	262	MI	PT	M	Other	Other
08S02E28H002	NA	37.20996	-121.75022	75	NA	NA	243.1	244.25	AG	ES	M	District	Other
08S02E34A001	NA	37.20073	-121.73285	60	NA	NA	256.9	257.4	AG	ES	M	District	Other
08S02E35B009	NA	37.19827	-121.72121	270	110	215	280	280	MI	ES	M	Other	Other
08S02E35G001	NA	37.19619	-121.71971	150	NA	NA	283.1	283.4	AG	ST	M	District	Other
08S02E35H008	NA	37.19449	-121.71622	270	150	250	290	290	MI	ES	Q	Other	Other
08S02E35M001	NA	37.19254	-121.72985	90	NA	NA	265.1	265.7	AG	ST	M	District	Other
08S02E35P002	NA	37.18731	-121.72386	220	90	200	272.25	272.25	MI	ES	M	Other	Other
08S02E36M007	371919N1217076W001	37.19190	-121.70766	120	95	110	291.5	293.75	MON	PT	D	District	District
09S02E01C001	NA	37.18387	-121.70646	150	NA	NA	298.85	299.25	DO	ES	M	District	Other
09S02E01J006	371790N1216958W001	37.17897	-121.69577	165	135	155	313.56	316.16	MON	PT	D	District	District
09S02E02C001	NA	37.18619	-121.72579	275	NA	NA	268	269.3	AG	ES	M	District	Other
09S02E02J002	NA	37.17864	-121.71247	114	NA	NA	288.1	289.3	AG	ES	BW	District	Other
09S02E02Q008	NA	37.17464	-121.71965	109	NA	NA	279.9	280.9	DO	ES	M	Other	Other
09S02E11C001	NA	37.17209	-121.72360	120	NA	NA	286.1	287.3	DO	ES	M	District	Other
09S02E12B001	NA	37.16888	-121.69950	180	NA	NA	312	312.5	AG	ES	M	District	Other
09S02E12E001	NA	37.16807	-121.70853	175	NA	NA	297.9	297.9	AG	ES	M	District	Other
09S03E07H003	NA	37.16706	-121.67712	300	NA	NA	345.1	346.3	AG	ES	M	District	Other
09S03E07L002	NA	37.16151	-121.68544	198	NA	NA	330.1	330.5	MON	PT	D	District	Other
09S03E08J016	NA	37.16397	-121.66135	285	NA	NA	366.1	366.4	AG	PT	D	District	Other

Table E-1. Santa Clara Subbasin Groundwater Level Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
09S03E09R004	371583N1216426W001	37.15833	-121.64264	380	NA	370	402.83	403.43	MON	PT	D	District	District
09S03E09R005	NA	37.15833	-121.64264	570	445	455	402.83	403.33	MON	ES	M	District	Other
09S03E16F002	371521N1216501W001	37.15214	-121.65009	520	480	500	378.7	378.5	MON	PT	D	District	District
09S03E17D004	371562N1216707W001	37.15620	-121.67068	232	NA	NA	351	353.6	MON (was MI)	ES	M	District	District

AG = Agricultural well AM = Airline Method Q = Quarterly

MI = Municipal well ES = Electric Sounder BM = Bimonthly

DO = Domestic well PG = Pressure Gauge M = Monthly

MON = Monitoring well PT = Pressure Transducer BW = Biweekly

ST = Steel Tape D = Daily W= Weekly

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

Table E-2. Llagas Subbasin Groundwater Level Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
09S03E15L013	371489N1216307W001	37.14893	-121.63068	200	NA	NA	390.10	390.10	DO	ES	M	District	District
09S03E16J001	NA	37.14770	-121.64181	400	NA	NA	384.8	385.3	AG	ES	M	District	Other
09S03E20K003	371343N1216641W001	37.13430	-121.66406	100	70	90	352.38	352.08	MON	ES	M	District	District
09S03E22P005	NA	37.13173	-121.63169	NA	NA	NA	354	355.1	MI	ES	M	District	Other
09S03E23L005	371357N1216158W001	37.13574	-121.61576	25	10	25	360.25	363.35	MON	PT	D	District	District
09S03E23P005	NA	37.13285	-121.61310	NA	NA	NA	354	356.91	MON	ES	M	District	Other
09S03E25P001	NA	37.11827	-121.59467	249	NA	NA	354.00	354.70	DO	ES	M	District	Other
09S03E26P001	NA	37.11889	-121.61384	250	NA	NA	329.1	329.8	AG	ES	M	District	Other
09S03E34G002	NA	37.11148	-121.62775	NA	NA	NA	315.90	316.30	AG	ES	M	District	Other
09S03E35C011	NA	37.11337	-121.61342	91	81	86	323	322.35	MON	PT	D	District	District
09S03E35P013	NA	37.10312	-121.61548	160	80	155	306.10	307.30	MI	ES	M	District	Other
10S03E01N005	370881N1216003W001	37.08730	-121.60056	132	NA	NA	285.1	286.4	MON	PT	D	District	District
10S03E02N002	NA	37.08706	-121.61571	215	155	215	286.00	286.30	DO	ES	M	District	Other
10S03E03D007	NA	37.09821	-121.63453	220	NA	NA	353	353	DO	ES	M	District	Other
10S03E11D010	NA	37.08326	-121.61586	181	80	181	279.10	279.40	AG	ES	M	District	Other
10S03E13D003	NA	37.06840	-121.59811	250	80	249	259.9	260.3	AG	ES	M	District	Other
10S03E13E006	NA	37.06696	-121.60075	51.5	31.5	51.5	257.70	261.10	MON	ES	M	District	District
10S03E13F005	NA	37.06748	-121.59489	52	32	52	262.03	265.13	MON	PT	D	District	District
10S03E13K004	NA	37.06291	-121.58871	NA	NA	NA	252.00	252.00	MI	ES	M	District	Other
10S03E14D001	NA	37.06980	-121.61729	200	NA	NA	271	271.2	DO	ES	M	District	Other
10S03E24M001	NA	37.04721	-121.60222	258	NA	NA	234.90	235.30	AG	ST	M	District	Other
10S03E25F001	370357N1215958W001	37.03570	-121.59581	165	125	145	219.2	219.1	MON	PT	D	District	District
10S04E06P009	NA	37.08693	-121.57733	200	NA	NA	306.10	307.10	DO	ES	BM	District	Other
10S04E07E031	NA	37.08216	-121.58266	160	NA	NA	287.1	287.7	DO	ES	M	District	Other
10S04E07F009	NA	37.08012	-121.57367	NA	NA	NA	300.90	301.70	AG	ES	M	District	Other
10S04E17K002	NA	37.06320	-121.55325	250	NA	NA	295.9	295.9	DO	ES	M	District	Other
10S04E17N002	NA	37.06038	-121.56122	425	NA	NA	255.90	256.00	DO	ES	M	District	Other
10S04E18N007	NA	37.05912	-121.58361	NA	NA	NA	244	243.25	MON	ES	M	District	Other
10S04E20G008	NA	37.05026	-121.55194	90	80	85	241.00	241.65	MON	PT	D	District	District

Table E-2. Llagas Subbasin Groundwater Level Monitoring Network continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Method	Frequency	Measured by	Owner
10S04E20M001	NA	37.04670	-121.56361	211	NA	NA	220.10	220.40	AG	ES	M	District	Other
10S04E21M002	NA	37.04705	-121.54469	NA	NA	NA	233.9	234.7	AG	ES	M	District	Other
10S04E28M005	370331N1215434W001	37.03314	-121.54339	60	50	60	203.00	202.74	MON	PT	D	District	District
10S04E28N006	370316N1215433W001	37.03163	-121.54328	572	532	552	206.99	209.12	MON	PT	D	District	District
10S04E30Q001	NA	37.03176	-121.57278	120	NA	NA	208.00	208.50	DO	ES	M	District	Other
10S04E32N003	NA	37.01480	-121.56329	NA	NA	NA	191.9	191.5	MON	ES	M	District	District
11S04E02D008	NA	37.01114	-121.50598	285	NA	NA	229.00	229.30	AG	ES	M	District	Other
11S04E02N001	NA	36.99622	-121.50133	430	NA	NA	175	176.2	AG	ES	M	District	Other
11S04E03G005	NA	37.01129	-121.51667	86	70	80	190.00	191.70	MON	PT	D	District	District
11S04E03J002	NA	37.00565	-121.51092	415	NA	NA	196	196.4	DO	ES	M	District	Other
11S04E04C008	NA	37.01309	-121.53925	250	NA	NA	191.00	192.00	DO	ES	M	District	Other
11S04E04F007	NA	37.00819	-121.54054	55	40	50	184	185.9	MON	ES	M	District	District
11S04E04Q012	NA	37.00217	-121.53701	39	NA	NA	185.50	185.25	MON	ES	M	District	District
11S04E05F001	370092N1215580W001	37.00916	-121.55801	107.5	NA	NA	187.05	187.25	MI	PT	D	District	District
11S04E05H002	370081N1215406W001	37.00812	-121.54066	260	120	260	184.00	186.50	MON	ES	M	District	District
11S04E07F004	369922N1215757W001	36.99221	-121.57567	200	160	180	207.8	207.5	MON	ES	M	District	District
11S04E08K002	NA	36.99064	-121.55087	300	53	274	178.10	178.30	AG	ES	M	District	Other
11S04E09J003	NA	36.99221	-121.53205	39	NA	NA	174.8	174.5	MON	ES	M	District	District
11S04E10D004	NA	36.99742	-121.52516	370	NA	NA	169.90	170.50	AG	ES	M	District	Other
11S04E10N001	369871N1215282W001	36.98714	-121.52825	550	510	530	164.8	164.49	MON	PT	D	District	District
11S04E15J002	NA	36.97736	-121.50958	NA	NA	NA	144.00	146.20	AG	ST	M	District	Other
11S04E15J003	NA	36.97668	-121.51234	53	48	53	147	146.7	MON	PT	D	District	District
11S04E17N004	NA	36.97376	-121.56188	80	NA	NA	180.10	181.30	AG	ES	M	District	Other
11S04E21G003	NA	36.96541	-121.53177	89	70	80	163	164.35	MON	PT	D	District	District
11S04E21P003	NA	36.95925	-121.53902	NA	NA	NA	155.00	155.90	AG	ES	M	District	Other
11S04E22N001	NA	36.95941	-121.52348	220	NA	NA	150	150.2	AG	ES	M	District	Other
11S04E28K001	369486N1215359W001	36.94856	-121.53592	335	295	335	136.35	139.60	MON	PT	D	District	District
11S04E28K002	NA	36.94832	-121.53596	100	85	95	136.25	138.75	MON	ES	M	District	District
11S04E32R002	369296N1215465W001	36.92961	-121.54654	170	NA	NA	140.10	140.60	AG	ES	M	District	District

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

See Page E-12 for full legend

Table E-3. Santa Clara Subbasin Groundwater Quality Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
05S03W36P005	374502N1221430W004	37.45024	-122.14299	200	180	200	21.67	20.88	MON	Annual	District
06S01W01M001	374376N1219291W001	37.43819	-121.92840	265	255	265	20.25	22.15	MON (was AG)	Annual	District
06S01W02N008	374339N1219478W001	37.43439	-121.94788	35	10	15	7	7	MON	Annual	District
06S01W10N007	374183N1219685W001	37.41831	-121.96857	83	73	78	7	7	MON	Annual	District
06S01W12G005	374263N1219245W001	37.42634	-121.92452	37	30.00	35.00	18.65	NA	MON	Annual	District
06S01W13C009	374143N1219255W001	37.41434	-121.92556	66	51	60	26	25.8	MON	Annual	District
06S01W14L005	374081N1219438W001	37.40819	-121.94386	47	37	42	15	15	MON	Annual	District
06S01W15R006	374042N1219541W001	37.40423	-121.95418	57	45	51	13	13	MON	Annual	District
06S01W17F002	374131N1220007W002	37.41317	-122.00068	210	190	200	2.5	2.27	MON	Annual	Other
06S01W17M009	374099N1220055W001	37.40997	-122.00554	45	20	45	11.25	NA	MON	Annual	District
06S01W18R007	374054N1220072W001	37.40458	-122.00727	45	20.00	45.00	15.25	NA	MON	Annual	District
06S01W22K010	373944N1219591W001	37.39443	-121.95919	100	60	65	23	23	MON	Annual	District
06S01W24H015	373962N1219156W001	37.39616	-121.91556	588	NA	NA	40	39.55	MON (was AG)	Annual	District
06S01W24J037	373947N1219149W001	37.39470	-121.91497	53	40	46	33	32.66	MON	Annual	District
06S01W24P007	373902N1219264W001	37.39027	-121.92647	96	81.00	86.00	27	27	MON	Annual	District
06S01W26K001	373804N1219385W001	37.38043	-121.93854	65	55	60	32	30.92	MON	Annual	District
06S01W26N006	373748N1219470W001	37.37486	-121.94703	100	77.00	82.00	40	40	MON	Annual	District
06S01W26R004	373776N1219362W004	37.37763	-121.93620	330	310	330	26.84	28.31	MON	Annual	District
06S01W36D004	373744N1219325W001	37.37441	-121.93253	70	60.00	65.00	26	26	MON	Annual	District
06S02W05F002	374429N1221039W002	37.44287	-122.10388	50	40	50	6.9	8.62	MON	Annual	District
06S02W05F003	374429N1221039W003	37.44288	-122.10388	200	190	200	6.9	7.4	MON	Annual	District
06S02W07B023	374287N1221216W001	37.42870	-122.12168	45	28	45	16	14.85	MON	Annual	District
06S02W09K021	374238N1220861W001	37.42380	-122.08610	47	20.00	45.00	14.45	NA	MON	Annual	District
06S02W16L021	374069N1220886W001	37.40688	-122.08863	40	20	40	38	37.5	MON	Annual	District
06S02W17L003	374095N1221097W001	37.40953	-122.10973	122	NA	NA	37.05	NA	DO	Annual	Other
06S02W24C008	374014N1220355W001	37.40137	-122.03546	250	NA	NA	30	32.34	MON	Annual	District
06S02W24J009	373953N1220272W001	37.39532	-122.02719	47	30	47	40	39.6	MON	Annual	Other
06S02W34J001	373646N1220626W001	37.36457	-122.06260	140	120	130	166.5	166.3	MON	Annual	District
06S03W01B010	374456N1221383W001	37.44565	-122.13829	101	93	98	21	20.23	MON	Annual	District

Table E-3. Santa Clara Subbasin Groundwater Quality Monitoring Network Continued

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
07S01E09L007	373368N1218695W004	37.33678	-121.86953	425	405	425	84.44	85.58	MON	Annual	District
07S01E09L008	373368N1218695W005	37.33677	-121.86953	72	62	72	84.33	85.76	MON	Annual	District
07S01E19B002	373162N1219032W001	37.31617	-121.90323	85	75	85	112.23	111.93	MON	Annual	District
07S01E19B006	373161N1219033W004	37.31611	-121.90325	240	220	240	112.23	112.43	MON	Annual	District
07S01E24P001	372807N1218369W001	37.28102	-121.83712	277	164	272	162.1	160.55	MON	Annual	Other
07S01E35E003	372799N1218361W001	37.27977	-121.83600	147	46	146	165	164.06	MON	Annual	Other
07S01W14P002	373177N1219435W002	37.31774	-121.94346	440	420	440	138.7	138.3	MON	Annual	District
07S01W14P005	373177N1219435W005	37.31774	-121.94346	150	130	150	138.7	138.3	MON	Annual	District
07S01W29C005	373008N1219975W003	37.30077	-121.99754	380	360	380	228.37	229.47	MON	Annual	District
07S01W35L015	372767N1219439W003	37.27667	-121.94389	300	280	300	216.58	215.68	MON	Annual	District
07S02E19C007	373161N1217973W003	37.31606	-121.79734	390	370	390	186.4	185.7	MON	Annual	District
07S02E19C009	373161N1217973W005	37.31606	-121.79735	150	130	150	186.4	185.6	MON	Annual	District
08S01E11N001	372470N1218400W001	37.24702	-121.83997	86	NA	NA	161.1	160.65	MON	Annual	District
08S01E21B001	372279N1218674W001	37.22797	-121.86740	80	40	80	217.25	NA	MI	Annual	Other
08S01E25N003	372016N1218171W001	37.20162	-121.81713	90	21	60	344	345.57	MI	Annual	District
08S01W10F002	372527N1219586W001	37.25260	-121.95883	458	NA	NA	280.8	282	AG	Annual	Other
08S02E16K001	372341N1217571W001	37.23406	-121.75714	223	195	215	233	234.5	MON	Annual	District
08S02E18G009	372395N1217938W001	37.23956	-121.79387	114	80	110	195.4	196.95	MON	Annual	Other
08S02E18G010	372396N1217939W001	37.23959	-121.79388	178	138	178	195.4	197.3	MON	Annual	District
08S02E22E002	372237N1217459W001	37.22366	-121.74588	110	75	95	237.38	239.52	MON	Annual	District
08S02E36M007	371919N1217076W001	37.19189	-121.70764	120	95	110	291.5	293.75	MON	Annual	District
09S02E02C001	371861N1217257W001	37.18618	-121.72578	275	NA	NA	268	269.3	AG/DO	Annual	Other
09S02E02R008	371741N1217156W001	37.17410	-121.71559	220	50	220	285.25	NA	AG/DO	Annual	Other
09S03E07J003	371624N1216793W001	37.16244	-121.67933	230	130	230	344	344	DO	Annual	Other
09S03E09R004	371583N1216426W001	37.15833	-121.64262	380	350	370	402.83	403.43	MON	Annual	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available
AG = Agricultural well
MI = Municipal well
DO = Domestic well
MON = Monitoring well

ft bgs = feet below ground surface
ft amsl = feet above mean sea level

Table E-4. Llagas Subbasin Groundwater Quality Monitoring Network

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
09S03E15K009	371449N1216221W001	37.14494	-121.62218	250	150	250	380.75	NA	DO	Annual	Other
09S03E20K003	371343N1216641W001	37.13430	-121.66405	100	70	90	352.38	352.08	MON	Annual	District
09S03E21C003	371427N1216478W001	37.14271	-121.64779	200	100	200	372	372	DO	Annual	Other
09S03E34P001	371043N1216314W001	37.10426	-121.63142	163	103	163	318	318	DO/MI	Annual	Other
09S03E35C012	371134N1216134W001	37.11340	-121.61344	61	45	55	323	323	MON	Annual	District
09S03E36B007	371152N1215933W001	37.11519	-121.59327	225	165	225	347.85	NA	DO	Annual	Other
10S03E01A009	370996N1215852W001	37.09957	-121.58521	300	NA	NA	314	314	DO	Annual	Other
10S03E02N002	370870N1216157W001	37.08705	-121.61570	215	155	215	286	286.3	DO	Annual	Other
10S03E03D007	370982N1216345W001	37.09820	-121.63451	120	NA	NA	353	353	DO	Annual	Other
10S03E12P003	370728N1215949W001	37.07284	-121.59489	182	100	182	263.2	262.2	DO	Annual	Other
10S03E13F005	370674N1215948W001	37.06748	-121.59488	52	32	52	262.03	265.13	MON	Annual	District
10S03E14P005	370602N1216128W001	37.06026	-121.61284	198	140	198	262.2	262.2	DO	Annual	Other
10S03E25F001	370357N1215958W001	37.03570	-121.59580	165	125	145	219.2	219.1	MON	Annual	District
10S03E36H001	370226N1215861W001	37.02262	-121.58609	440	220	260	205.75	NA	MON	Annual	Other
10S04E07E031	370821N1215826W001	37.08216	-121.58265	130	NA	NA	287.1	287.7	DO	Annual	Other
10S04E07E033	370808N1215817W001	37.08081	-121.58166	228	180	228	282.35	NA	DO	Annual	Other
10S04E17K002	370632N1215532W001	37.06320	-121.55324	250	NA	NA	295.9	295.9	DO	Annual	Other
10S04E19K006	370474N1215725W001	37.04747	-121.57256	295	175	295	230	230	DO	Annual	Other
10S04E20G008	370502N1215519W001	37.05025	-121.55193	90	80	85	241	241.65	MON	Annual	District
10S04E28M005	370331N1215434W001	37.03313	-121.54338	60	50	60	203	202.74	MON	Annual	District
10S04E32E006	370236N1215627W001	37.02361	-121.56269	285	225	280	203.05	NA	MON	Annual	Other
11S03E01Q002	37004N1215894W001	37.00036	-121.58945	44	29	44	213.84	213.63	MON	Annual	District
11S03E02E001	370098N1216193W001	37.00977	-121.61935	100	60	100	238.55	NA	DO	Annual	Other
11S04E03G005	370112N1215166W001	37.01129	-121.51665	86	70	80	190	191.7	MON	Annual	District
11S04E04F007	370081N1215405W001	37.00818	-121.54053	55	40	50	184	185.9	MON	Annual	District
11S04E05F001	370092N1215580W001	37.00916	-121.55800	107	NA	NA	187.05	187.25	MON (was AG)	Annual	District
11S04E05H002	370081N1215406W001	37.00812	-121.54064	260	120	260	184	186.5	MON (was AG)	Annual	District
11S04E08K002	369906N1215508W001	36.99063	-121.55086	300	53	274	178.1	178.3	AG/DO	Annual	Other
11S04E08K008	369910N1215519W001	36.99108	-121.55194	103	48	98	181.75	NA	MON	Annual	Other

Table E-4. Llagas Subbasin Groundwater Quality Monitoring Network Continued

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Owner
11S04E10L017	369906N1215182W001	36.99058	-121.51823	150	50	150	161.55	NA	DO	Annual	Other
11S04E11J007	369893N1214936W001	36.98934	-121.49358	230	120	220	159.45	NA	DO	Annual	Other
11S04E15P003	369736N1215177W001	36.97366	-121.51771	248	161	242	150.25	NA	DO	Annual	Other
11S04E21J003	369625N1215308W001	36.96247	-121.53084	200	160	200	160.65	NA	DO	Annual	Other
11S04E28K001	369486N1215359W001	36.94856	-121.53591	335	295	335	136.35	139.6	MON	Annual	District
11S04E28K002	369483N1215359W001	36.94832	-121.53595	100	85	95	136.25	138.75	MON	Annual	District

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

NA = value not available
AG = Agricultural well
MI = Municipal well
DO = Domestic well
MON = Monitoring well

ft bgs = feet below ground surface
ft amsl = feet above mean sea level

Table E-5. Santa Clara Subbasin Recycled Water Monitoring Network

Well Number	CASGEM WELL ID	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen ft bgs	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Measured By	Owner
06S01E31K001	373651N1219028W001	37.36520	-121.90277	752	412	684	64	64	MI	Annual	SBWR	Other
06S01E33F006	373695N1218682W001	37.36955	-121.86818	680	267	603	94.2	94.2	MI	Annual	SBWR	Other
07S01E04D004	373592N1218756W001	37.35924	-121.87557	43	8	44	81.5	81.5	MON	Annual	SBWR	Other
07S01E07D031	373472N1219070W001	37.34725	-121.90705	37.5	14	34	63.4	63.4	MON	Annual	SBWR	Other
07S01E09D007	373449N1218744W001	37.34492	-121.87443	764	402	684	96	96	MI	Annual	SBWR	Other
07S01E09D008	373451N1218745W001	37.34511	-121.87450	850	446	830	95.7	95.7	MI	Annual	SBWR	Other
07S01E16C006	373252N1218685W001	37.32819	-121.86851	716	508	697	107.9	107.9	MI	Annual	SBWR	Other
07S01E16G019	373258N1218626W001	37.32582	-121.86260	51.5	28	48	108.7	108.7	MON	Annual	SBWR	Other
07S01E16J001	373226N1218610W001	37.32266	-121.86097	221	115	170	83	83	IRR	Annual	SBWR	Other
07S01E21E003	373126N1218745W001	37.31260	-121.87455	803	406	785	111.9	111.9	MI	Annual	SBWR	Other
07S01E28C002	373026N1218628W001	37.30262	-121.86277	92	69	89	121.6	121.6	MON	Annual	SBWR	Other
07S01E35D003	372869N1218333W001	37.28689	-121.83335	63.5	40	60	157.1	157.1	MON	Annual	SBWR	Other
07S02E29H005	372979N1217692W001	37.29787	-121.76916	59.5	36	56	345.4	345.4	MON	Annual	SBWR	Other
08S02E07A014	372571N1217872W001	37.25711	-121.78724	45	25	45	202.6	202	MON	Quarterly	IDT/District	Other
08S02E07A015	372562N1217876W001	37.25617	-121.78760	45	25	45	204.5	203.9	MON	Quarterly	IDT/District	Other
08S02E08D011	372559N1217846W001	37.25594	-121.78461	45	25	45	200.98	200.48	MON	Quarterly	IDT/District	Other
08S02E08D012	372573N1217849W001	37.25735	-121.78488	45	25	45	201.81	201.46	MON	Quarterly	IDT/District	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

Not all wells sampled by SBWR are sampled every year

ft bgs = feet below ground surface
ft amsl = feet above mean sea level
SBWR = South Bay Water Recycling
IDT = Integrated Device Technology, Inc.

MON = Monitoring Well
MI = Municipal Well
IRR = Irrigation Well

Table E-6. Llagas Subbasin Recycled Water Monitoring Network

Well Number	CASGEM Well Number	Latitude	Longitude	Depth (ft bgs)	Top of First Screen (ft bgs)	Bottom of Last Screen (ft bgs)	Ground Surface Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Well Type	Frequency	Measured By	Owner
11S03E01E003	370068N1216008W001	37.00680	-121.60083	100	77	97	221.7	221.24	MON	Quarterly	District	District
11S03E01E004	370073N1216006W001	37.00731	-121.60063	41	20	40	222.86	222.56	MON	Quarterly	District	District
11S03E01E005	370068N1216009W001	37.00683	-121.60086	42	20	40	221.93	221.5	MON	Quarterly	District	District
11S03E01Q002	370004N1215895W001	37.00036	-121.58945	44	29	44	213.84	213.63	MON	Quarterly	District	District
11S03E02H004	370072N1216017W001	37.00717	-121.60174	42	20	40	223.44	223.24	MON	Quarterly	District	District
11S03E12A002	369987N1215864W001	36.99870	-121.58642	45	29	44	207.88	207.47	MON	Quarterly	District	District
11S03E12A003	369971N1215843W001	36.99707	-121.58434	45	29	44	209.1	208.66	MON	Quarterly	District	District
11S04E07F004	369922N1215756W001	36.99220	-121.57566	200	160	180	207.8	207.5	MON	Quarterly	District	District
11S04E07J005	369893N1215650W001	36.98928	-121.56498	55.5	33	53	194.76	194.17	MON	Quarterly	District	District
11S04E08C003	369959N1215576W001	36.99594	-121.55764	45	NA	NA	188.97	189.45	MON	Quarterly	District	District
11S04E08D006	369958N1215604W001	36.99582	-121.56037	35	NA	NA	190.39	190.74	MON	Quarterly	District	District
11S04E08M013	369894N1215635W001	36.98942	-121.56354	54	36	51	191.63	191.22	MON	Quarterly	District	District
11S04E08M015	369893N1215634W001	36.98938	-121.56337	80	55	77	191.55	191.45	MON	Quarterly	District	District
11S04E08N009	369869N1215642W001	36.98691	-121.56419	60	37	57	190.61	190.01	MON	Quarterly	District	District
11S04E09D002	369967N121.5465W001	36.99670	-121.54648	38.8	NA	NA	178.01	177.82	MON	Quarterly	District	District
11S04E09M001	369913N1215440W001	36.99127	-121.54399	40	NA	NA	175.17	175.62	MON	Quarterly	District	District
11S04E15M002	369752N1215286W001	36.97519	-121.52860	39	10	30	153	156	MON	Quarterly	District	Other
11S04E16F001	369811N1215364W001	36.98117	-121.53637	40	NA	NA	169.4	171.56	MON	Quarterly	District	Other
11S04E16G003	369822N1215283W001	36.98223	-121.52833	125	100	110	156.65	158.9	MON	Quarterly	District	Other
11S04E16M011	369766N1215435W001	36.97659	-121.54347	47	NA	NA	173.1	175.68	MON	Quarterly	District	Other

All elevations listed above are reported relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). In Santa Clara County, the average conversion to obtain elevations relative to the North American Vertical Datum of 1988 (NAVD 88) is to add 2.75 feet.

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

MON = Monitoring Well

NA = Value not avilable